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MECHANIX ILLUSTRATED

JANUARY

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Your Job?

SEE PAGE 35
FOR AN IMPORTANT
STORY

BLOOD DETECTIVES SOLVE CRIMES!

JANUARY 1940
MECHANIX ILLUSTRATED
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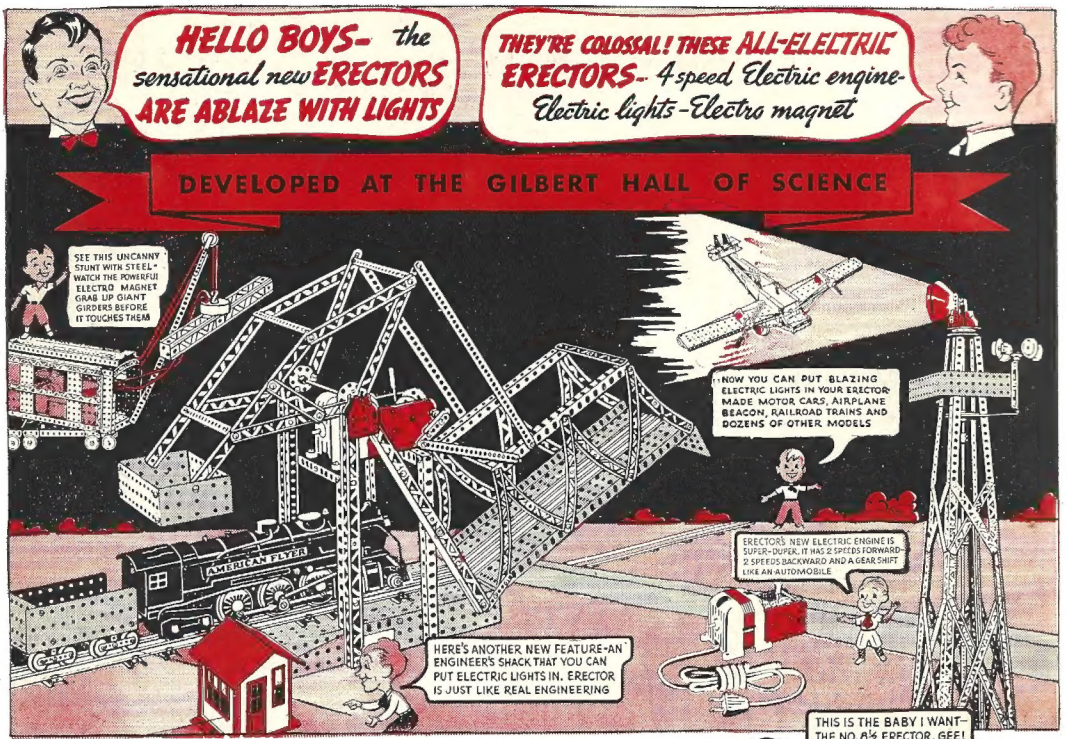
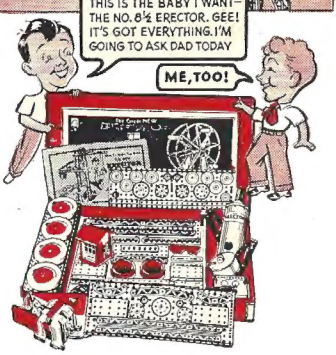

HELLO BOYS- the sensational new ERECTORS ARE ABLAZE WITH LIGHTS
THEY'RE COLOSSAL! THESE ALL-ELECTRIC ERECTORS- 4 speed Electric engine- Electric lights - Electro magnet
DEVELOPED AT THE GILBERT HALL OF SCIENCE
SEE THIS UNCANNY STUNT WITH STEEL- WATCH THE POWERFUL ELECTRO MAGNET GRAB UP GIANT GIRDERS BEFORE IT TOUCHES THEM
NOW YOU CAN PUT BLAZING ELECTRIC LIGHTS IN YOUR ERECTOR-MADE MOTOR CARS, AIRPLANE BEACON, RAILROAD TRAINS AND DOZENS OF OTHER MODELS
ERECTOR'S NEW ELECTRIC ENGINE IS SUPER-DUPER. IT HAS 2 SPEEDS FORWARD-2 SPEEDS BACKWARD AND A GEAR SHIFT LIKE AN AUTOMOBILE
HERE'S ANOTHER NEW FEATURE-AN ENGINEER'S SHACK THAT YOU CAN PUT ELECTRIC LIGHTS IN. ERECTOR IS JUST LIKE REAL ENGINEERING
AMERICAN FLYER

BOYS! Leading toy stores are showing a sensational new kind of Erector this year. An Erector that makes model-building more fun than the movies—more exciting than a football game. Because Erector has gone *all-electric.*

Now, for the first time, you can build a revolving airplane beacon with a real electric searchlight—construct electrically lighted railroad trains, Ferris wheel, airplanes, motor cars—erect electric bridges that open and close—make mighty cranes that grab up steel girders by electro-magnetic power.

You can build all the engineering marvels you see on this page—and 100 more—with one Erector set. Put dazzling electric lights on them. Make them buzz with action with the new 4-speed Erector electric engine. There are more blood-tingling thrills in the new All-Electric Erector than in a dozen ordinary toys. Tell Dad that Erector is your No. 1 choice of Christmas presents.



Get a load of the No. 8½ All-Electric Erector. Crammed with exciting electrical and structural parts. Electric lights—110 volt electric engine with 4 speeds and automobile-type gear shift—powerful electro-magnet. Also, polished steel boiler shell—big red wheels—steel girders and red, yellow and blue structural plates—gears and pinions—a total of 18 lbs. of up-to-the-minute parts for building over 100 colossal, engine-driven, electrically lighted engineering marvels. Price $12.95; other Erectors from $1.00 to $29.95.

The Sensational New ALL-ELECTRIC

ERECTOR

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MECHANIX ILLUSTRATED

JANUARY
1940

Volume XXIII
Number 3

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WHAT HAPPENS when an irresistible force meets an immovable object?

That teaser has stymied physics students the world over, and nobody, to date, has figured out the perfect answer. Until somebody figures out the answer—and it'll take a little time—the best bet is to take a look at the war front between France and Germany.

What's going to happen when the irresistible German "Blitzkreig" meets the immovable Maginot Line?

Or, for that matter, what's going to happen when the irresistible Allied advance smacks up against the Siegfried Line?

"Can This War Be Won?" in the February MI, will give you the dope on those two "immovables," the Maginot and Siegfried lines, and you can place your bets accordingly.

The new MECHANIX ILLUSTRATED is on sale at all newsstands the first of every month.

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When jobs are looking for men —thats news!

1 Look here, Frank—Two full columns of male help wanted—your kind of work!
Yes I noticed it—Last year at this time there wasn't half that much
2 H'lo, Frank—you're an office man—Do you know where we could get a manager for our Accounting Department?
Gee—I wish I could qualify!
3 You say Mary's husband just got a new job at double his old salary?—That settles it, Honey—the time has come for us to get out of the rut, too. I'm going to write LaSalle tonight!
4 1 year later—
I stayed late at the office, Honey, to get off my last examination paper—now I'm Somebody!
That's swell, Napoleon—here's a letter that came today
5 Honey, look at this!—We're out of the rut at last! Doberry & Co want me to come and see them—just the job I wanted. And say—am I glad I'm prepared for it!

. . . . . NOW IS THE TIME! . . . . . .

RIGHT now, in many lines there is a search for really *good* men—managers, leaders—men who can take charge of departments, businesses, branch offices, and set things humming.

As always, there are not enough ordinary jobs to go 'round—but rarely before in the history of American business, has there been so much room at the *top!*

Ordinarily, there would be plenty of men to fill these jobs—men in junior positions who have been studying in spare time. But most men have been letting their training slide during these dark years of depression . . . "What's the use?"—You have heard them say. Perhaps there has been some excuse for sticking to any old kind of a job one could get the past few years—but the door is wide open for the man with ambition *NOW!*

And don't let anyone tell you that "Opportunity Only Knocks Once"—that's one of the most untruthful sayings ever circulated. Opportunities flourish for *every* American every day of his life.

Far more to the point is to be ready—be *prepared*—to make yourself *interesting* to the big-time employer—and, LaSalle offers you a short-cut method of qualifying for opportunity jobs in accounting, law, traffic, executive management, and kindred occupations.

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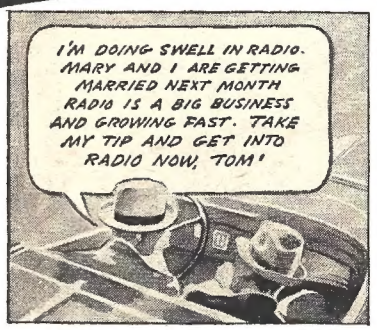
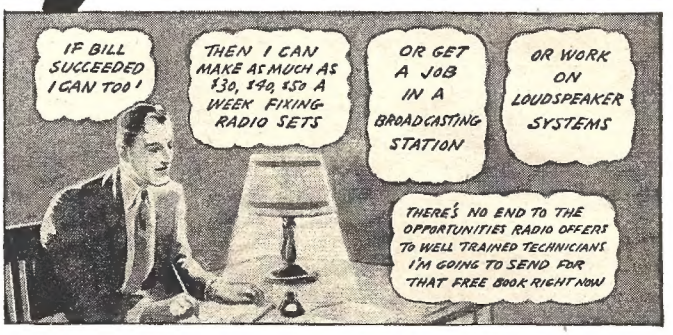
HOW A "TIP" GOT TOM A GOOD JOB

I HAVEN'T HAD A RAISE IN YEARS -- GUESS I NEVER WILL-- I'M READY TO GIVE UP HOPE
BUCK UP TOM, WHY NOT TRY AN INDUSTRY THAT'S NEW AND GROWING WHERE THERE'S PLENTY OF OPPORTUNITY


I'M DOING SWELL IN RADIO. MARY AND I ARE GETTING MARRIED NEXT MONTH RADIO IS A BIG BUSINESS AND GROWING FAST. TAKE MY TIP AND GET INTO RADIO NOW, TOM!


IF BILL SUCCEEDED I CAN TOO!
THEN I CAN MAKE AS MUCH AS $30, $40, $50 A WEEK FIXING RADIO SETS
OR GET A JOB IN A BROADCASTING STATION
OR WORK ON LOUDSPEAKER SYSTEMS
THERE'S NO END TO THE OPPORTUNITIES RADIO OFFERS TO WELL TRAINED TECHNICIANS I'M GOING TO SEND FOR THAT FREE BOOK RIGHT NOW

I will train YOU too at Home in Spare Time for Good Jobs in Radio

J. E. SMITH, President
National Radio Institute
Established 25 Years

Radio is a young, growing field with a future. It offers many good pay spare time and full time job opportunities. And you don't have to give up your present job, go away from home, or spend a lot of money to become a Radio Technician. I train you right at home in your spare time.

Jobs Like These Go to Men Who Know Radio

Radio broadcasting stations employ engineers, operators, technicians and pay well for trained men. Radio manufacturers employ testers, inspectors, foremen, servicemen in good-pay jobs with opportunities for advancement. Radio jobbers and dealers employ installation and servicemen. Many Radio Technicians open their own Radio sales and repair businesses and make $30, $40, $50 a week. Others hold their regular jobs and make $5 to $10 a week fixing Radios in spare time. Automobile, police, aviation, commercial Radio; loudspeaker systems, electronic devices, are newer fields offering good opportunities to qualified men. And my Course includes Television, which promises to open many good jobs soon.

Why Many Radio Technicians Make $30, $40, $50 a Week

Radio is already one of the country's large industries even though it is still young and growing. The arrival of Television, the use of Radio principles in industry, are but a few of many recent Radio developments. More than 28,000,000 homes have one or more Radios. There are more Radios than telephones. Every year millions of Radios get out of date and are replaced. Millions more need new

I Trained These Men

Makes $50 to $60 a Week

"I am making between $50 and $60 a week after all expenses are paid, and I am getting all the Radio work I can take care of, thanks to N.R.I."

H. W. SPANGLER
126½ S. Gay St., Knoxville, Tenn.

$10 to $20 Week in Spare Time

"I repaired many Radio sets when I was on my tenth lesson. I made $600 in a year and a half, and I have made an average of $10 to $20 a week—just spare time."

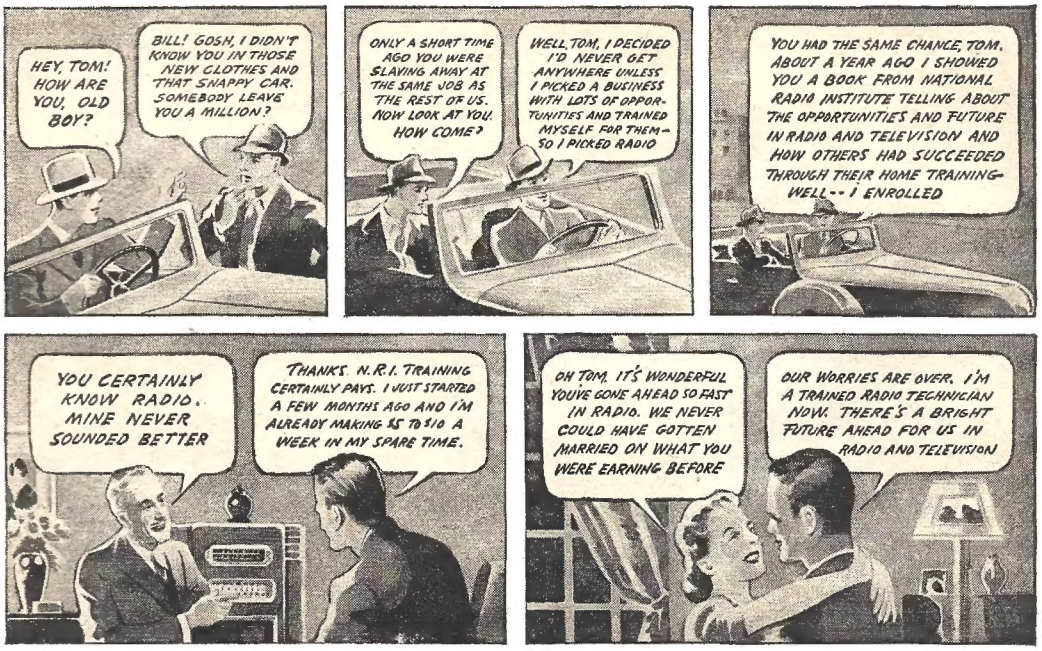
JOHN JERRY
1529 Arapahoe St., Denver, Colo.

Operates Public Address System

"I have a position with the Los Angeles Civil Service, operating the Public Address System in the City Hall Council. My salary is $170 a month."

R. H. ROOD, R 136, City Hall
Los Angeles, Calif.

Get Facts About THIS


HEY, TOM! HOW ARE YOU, OLD BOY?
BILL! GOSH, I DIDN'T KNOW YOU IN THOSE NEW CLOTHES AND THAT SNAPPY CAR. SOMEBODY LEAVE YOU A MILLION?
ONLY A SHORT TIME AGO YOU WERE SLAVING AWAY AT THE SAME JOB AS THE REST OF US. NOW LOOK AT YOU. HOW COME?
WELL, TOM, I DECIDED I'D NEVER GET ANYWHERE UNLESS I PICKED A BUSINESS WITH LOTS OF OPPORTUNITIES AND TRAINED MYSELF FOR THEM— SO I PICKED RADIO
YOU HAD THE SAME CHANCE, TOM. ABOUT A YEAR AGO I SHOWED YOU A BOOK FROM NATIONAL RADIO INSTITUTE TELLING ABOUT THE OPPORTUNITIES AND FUTURE IN RADIO AND TELEVISION AND HOW OTHERS HAD SUCCEEDED THROUGH THEIR HOME TRAINING— WELL-- I ENROLLED
YOU CERTAINLY KNOW RADIO. MINE NEVER SOUNDED BETTER
THANKS, N.R.I. TRAINING CERTAINLY PAYS. I JUST STARTED A FEW MONTHS AGO AND I'M ALREADY MAKING $5 TO $10 A WEEK IN MY SPARE TIME.
OH TOM, IT'S WONDERFUL YOU'VE GONE AHEAD SO FAST IN RADIO. WE NEVER COULD HAVE GOTTEN MARRIED ON WHAT YOU WERE EARNING BEFORE
OUR WORRIES ARE OVER. I'M A TRAINED RADIO TECHNICIAN NOW. THERE'S A BRIGHT FUTURE AHEAD FOR US IN RADIO AND TELEVISION

tubes, repairs, etc. Over 5,000,000 auto Radios are in use and thousands more are being sold every day. In every branch Radio is offering more opportunities—opportunities for which I give you the required knowledge of Radio at home in your spare time. Yes, the few hundred $30, $40, $50 a week jobs of 20 years ago have grown to thousands.

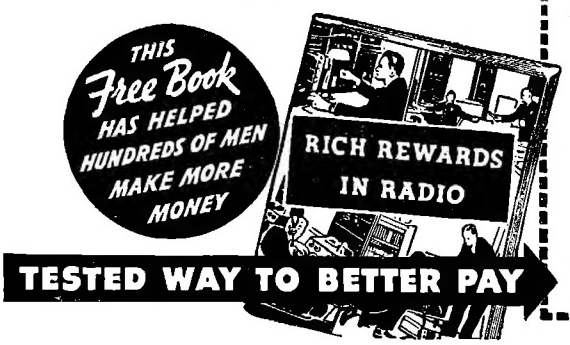
Many Make $5, $10 a Week Extra in Spare Time While Learning

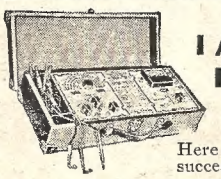
The day you enroll, I start sending you Extra Money Job Sheets which start showing you how to do Radio repair jobs. Throughout your Course I send plans and directions which have helped many make $200 to $500 a year in spare time while learning. I send special Radio equipment to conduct experiments and build circuits. This 50-50 training method makes learning at home interesting, fascinating, practical.

Find Out What Radio Offers You

Act today. Mail coupon for my 64-page book, "Rich Rewards in Radio." It points out Radio's spare time and full time opportunities and those coming in Television; tells about my course in Radio and Television; shows many letters from men I trained, telling what they are doing and earning. Read my money back agreement. Find out what Radio offers you. Mail coupon in envelope or paste on penny postcard—**NOW.**

J. E. SMITH, President, Dept. OAH,
National Radio Institute,
Washington, D. C.





I Also Give You This Professional Servicing Instrument

Here is the type of instrument successful Radio Technicians use —an All-Wave Set Servicing Instrument. It contains everything necessary to measure A.C. and D.C. voltages and current; to check resistances; adjust and align any set, old or new. It satisfies your needs for professional servicing after you graduate—can help you make extra money fixing sets while learning.

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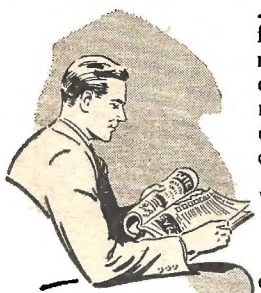

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INVENTIVE-MINDED MEN: Be sure to read carefully the questions on this page, then check off in the coupon below the numbers which you wish us to answer.

1. Is it possible for me to determine in advance just what my patent application will cost?
2. Will it be necessary that I come to Washington, D. C., to start my application for a patent?
3. Is there any way in which I can protect my invention without securing a patent?
4. When will it be safe to disclose my invention to manufacturers and prospective buyers?
5. Can I secure protection on my invention by copyright or trademark registration?
6. If I secure financial assistance, can I protect myself and my partner by assigning to him an interest in my application and the patent that may result therefrom?
7. After I file my application, is it safe for me to take steps to sell my invention?
8. Where two or more rival inventors have filed applications for patent on the same patentable invention, is the patent granted to the first one to file?
9. Where two or more persons jointly invent a patentable invention, are they partners who share equally in any profits derived from any patent secured?
10. If I patent my invention in the United States but do not patent it in foreign countries, can my invention be manufactured in those countries and shipped into and sold in the United States without infringement of my patent?

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MAIN OFFICE 580-A VICTOR BLDG., Washington, D. C., Pittsburgh Office 514-B Empire Bldg.

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1, ☐; 2, ☐; 3, ☐; 4, ☐; 5, ☐; 6, ☐; 7, ☐; 8, ☐; 9, ☐; 10, ☐

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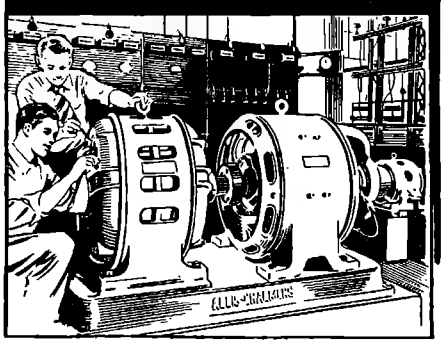

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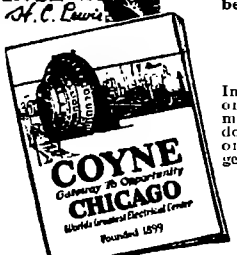

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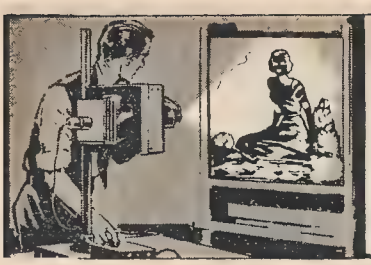


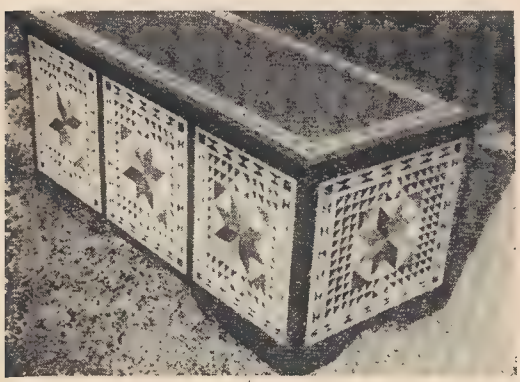
Chips from the EDITOR'S WORKBENCH

Send in photos of your completed workshop projects. Each month MECHANIX ILLUSTRATED awards a first prize of $5 for the best photo and letter received by this department and prizes of $3 each for all other photos and letters used. Do not send negatives. Have copies of your photos made before you submit them, as NO PHOTOS WILL BE RETURNED.

First prize for this month, a check for $5, is winging its way out to Harry Turner in Parsons, Kansas, for the swell job he did in building the *Buzzer* II from plans in our HOW TO BUILD 20 BOATS. "Many people have asked me if this isn't a professionally built job," he reports, "and were amazed when I told them I did all the work myself. I told all of them where they could get the plans and assured them they would have no difficulty in building a similar craft if they followed directions closely." Thanks, Harry!

Front and rear vies of Turner's boat are shown as it rests on a trailer on its way to the water. The craft was constructed with oak framing and ribbon grained mahogany planking. Covering boards are black and bottom planking red. Powered with a Johnson engine, the rakish craft has a speed of 25 miles an hour and is a very nice running job, Turner informs us. It looks it!

A YEAR ago I wrote a long article for MI entitled "Exploding the Television Boom," in which I said some very nasty things about this orphan of the radio industry. I opined that television was the victim of premature and undeserved promotion of the most extravagant sort, that receiver prices were too high and programs too skimpy, and that, in general, people were being misled into thinking that television was an accomplished public service. I wish that I could now report penitently that I was all wrong, but unhappily and without enthusiasm I must say, "I told you so."



Russell Bonshard of Venice, Ill., who informs us that he is 18 years old, is the designer and builder of this handsome inlaid cedar chest, for which we are awarding him a $3 prize. The chest is made of seven different kinds of hard wood and has 1,500 pieces of inlay in it. Total cost of the project was $8 and one year of spare time work was required to complete the job.

The sale of receivers in the metropolitan New York area has been extremely disappointing. The most optimistic report admits less than a thousand sets, and I'm inclined to divide that figure by two. One of the largest and most aggressive dealers in the city told me privately that he sold only six receivers during the heat of the initial publicity splurge, but five of them went to industrial firms and only one to a legitimate consumer! Dealers make no secret of their bitterness over the whole fiasco, and many of them no longer even keep sets in their stores for demonstration purposes.

"A large part of the present programs consists of grade B films," they wail. "How can we expect people in their right minds to plunk down from $300 to $600 for an instrument that gives them punk movies?"

The public indifference to television was clearly noticeable at the New York World's Fair. Visitors crowded through the exhibits and enjoyed the sight of giggling girls and perspiring men under the hot lights of the demonstration studios, but

[*Continued on page* 16]

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Editor's Workbench Chips

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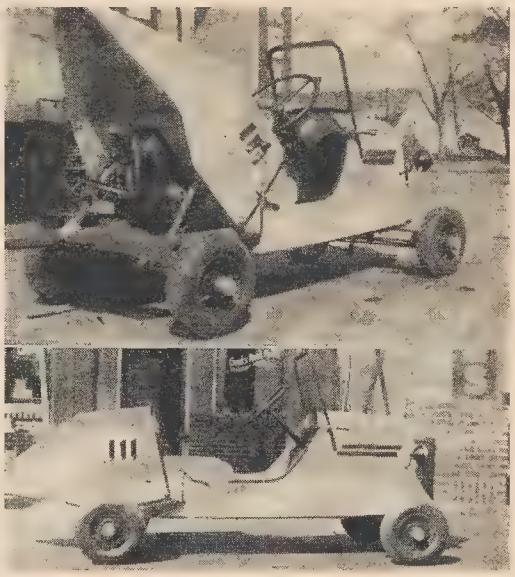

This neat little auto built from parts of junked cars is a $3 prize winner for its builder, B. M. Jones of Battle Creek, Iowa. The spindles, which were turned down on a lathe to fit the wheel hubs, are from a Model T Ford. The rear axle is from a Chevrolet, steering column and wheel from an Allis-Chalmers tractor, and small headlights from an Essex. Power comes from a one-half horsepower engine. The car has a speed of 18 miles an hour and an electric horn under the hood warns of its approach.

they went out with a "So what?" expression on their faces. The flame of interest just hasn't struck yet.

Technically, television transmission from the NBC station on the Empire State Building (still the only station on the air in the East, wild promises by numerous other stations and chains notwithstanding) has improved vastly in the last year. I recently visited the NBC studios in Radio City and was greatly impressed by the strides that have been made there in camera, lighting, and studio methods. Studio programs still are admittedly weak, but the technique of handling outside sporting events has become especially good. In some cases owners of television receivers have enjoyed better "views" of football games and prizefights than the audience in the stands! Fight broadcasts, more than any other single type of program, helped to put sound radio on the map; maybe they will do as much for sight radio . . . I hope.

***

There seems to be a lot of confusion over blind *flying* and blind *landing*, even among well-read aviation enthusiasts who should know better. Blind *flying* is a well-established practice among

[*Continued on page* 18]

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Editor's Workbench Chips

[*Continued from page* 16]

Privates Irvin Sutley and Charles Sacket of Fort Lewis, Wash., are the recipients of $3 for the gasoline model airplane they constructed. The little ship, which the boys call "Betsy," has made several successful flights. Though it has suffered a few minor crackups, the damage has been repaired without impairing the plane's flying ability.

both commercial and private fliers, and is made possible by an elaborate system of radio aids maintained over the Federal airways systems. As long as there is a clear field at the destination, a pilot will take you off in any kind of soup and fly you where you want to go, without ever seeing the ground until he comes through the overcast at the end of the trip. That's routine stuff now, about as romantic as a railroad journey. But if the field itsn't open at the end of the trip, you don't even start.

"What's the matter?" you ask. "Can't the pilots land blind, on instruments?" Yes, they can. They have made more than four thousand successful blind *landings* under real or simulated conditions of zero-zero weather, by means of the seven different blind landing systems now in existence, but never with paying passengers. The systems are still in the experimental stage, all having certain relative advantages and disadvantages that must be balanced up before any one system can be adopted as standard for the numerous flying services with which the United States is blessed.

Ordinarily, these blind landing systems would, in natural competition, eliminate one another as

[*Continued on page* 19]

An award of $3 goes to Nicholas Rahal of Danbury, Conn., for this photo enlarger he constructed. It has a double condenser system, uses an interchangeable lens from a camera and permits enlargements of 18 diameters on the baseboard. Using a 40-watt mazda lamp with negatives of more than average density, normal exposure time is only five seconds.

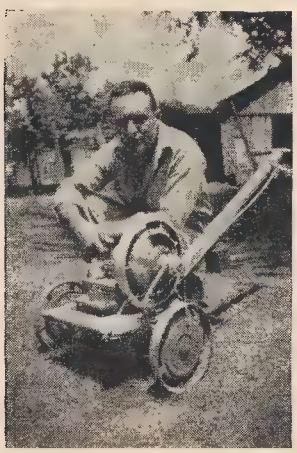
Editor's Workbench Chips

[*Continued from page* 18]

Marshall Dean of Falls Village, Conn., wins a $3 award for this boat. It is ten feet long and powered with an old washing machine engine. The half-inch propeller shaft goes through the bottom of the boat and is connected with the motor by means of a belt, which can be tightened or loosened by means of a lever. The boat has a speed of about five miles an hour.

research and refinement on them continued. However, with military preparedness being undertaken by the United States at an unprecedented pace (after twenty years of virtual stagnation), the feeling exists that it may be better to have one good system installed immediately for civil and military aviation, rather than enter a possible conflict totally unprepared. Accordingly, President Roosevelt has asked the National Academy of Sciences to study the seven blind landing systems and to select one that looks like the best "bet." The findings of this body are eagerly awaited, for on them rests the future safety of millions of dollars worth of planes and millions of air travelers. As soon as the system is picked, we will print a full description of it and how it works in the first available issue of MI.

[*Continued on page* 20]



To Lee Smith of Quinton, Oklahoma, goes a $3 award for a power lawn mower he constructed, using an old washing machine engine, which he purchased for $2.50, for the power plant. The engine is bolted to a board located under the lower end of the mower's handle. A belt that can be tightened or loosened by a tension spring serves as a clutch. Total cost, including engine, pulleys, belt, etc., was only $4. and the machine, Smith claims, will cut grass twice as fast as a hand pushed mower.

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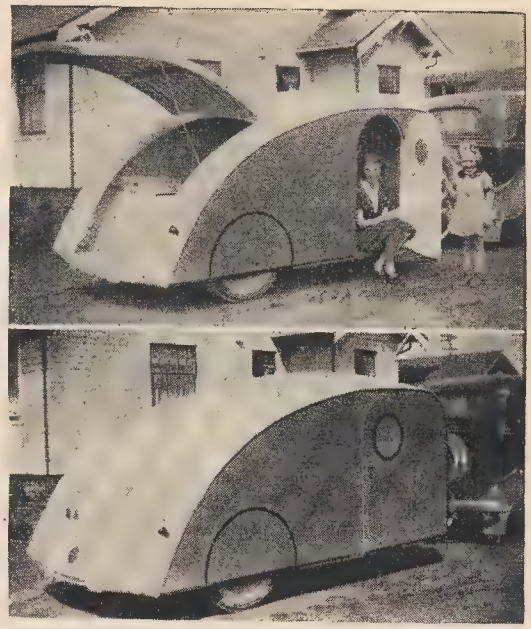
Editor's Workbench Chips

[*Continued from page* 19]



Stan Hopkins of Tacoma, Wash., who writes, "I've always wanted to make something that will get into the Workbench department," gets his wish and $3 for this trailer he built. Time and money required were three months and $75. The trailer is finished outside in gold and silver with black trim. The kitchen has a stove, sink and 12½ inch galvanized water tank and is finished in aluminum. It tows first rate at 60 miles an hour, Hopkins reports.

I hesitate to apply an adjective like "glamourous" to as concrete an undertaking as an airport, but if ever an airport deserved it, New York's new municipal field at North Beach certainly does. When the grounds were thrown open to the public for the first time on October fifteenth, 350,000 people swarmed over them to gape at the tremendous hangars and the beautiful buildings, and to crane their necks as scores of military, naval and private planes swooped in for graceful landings on the long runways. Maybe you've seen crowds of 25,000 or 50,000 at baseball games, or 100,000 at football games (Soldiers' Field in Chicago holds about 125,000), so perhaps you can imagine what 350,000 was like!

The following Sunday, with no program or activities of any kind scheduled (there wasn't even any commercial flying yet), another 50,000 eager, air-minded visitors descended on the field and practically took it away from the WPA watchman until the police arrived in response to a panic call and got things under control. The designers of North Beach thoughtfully provided a long observation ramp right under the control tower, and this was one seething mass of humanity from dawn until after dusk. I don't have to be much of a prophet to predict that this field will soon be

[*Continued on page* 21]

Editor's Workbench Chips

[*Continued from page* 20]

New York's No. 1 outdoor attraction for rubberneckers. If the sight of a couple of Stinsons landing and taking off made the onlookers applaud, what'll they do when the mammoth DC-3's and DC-4's, to say nothing of the Atlantic Clippers, start rolling in and out on schedule?

***

The nervy U-boat commander who trailed a british destroyer right into Scapa Flow and nonchalantly sank the *Royal Oak* was rewarded with an Iron Cross. In my 'umble opinion I think he also deserves the Victoria Cross. Why? Because he jarred the English out of their smug, complacent conviction that Brittania rules the waves. They seem to have forgotten completely the lessons of the last war, and again they have been caught napping when they should have been on the alert.

"How did the submarine get by the 'sub detectors' with which every British surface vessel is supposed to be equipped?" This question has been asked by every mechanically-minded man.

[*Continued on page* 22]

This electric bicycle wins a prize for Lester Stevenson, who runs a garage in Wilmar, Calif. Power is supplied by a large capacity storage battery which runs a generator converted into a motor. The latter drives a timing gear to which is connected a shaft that has a small sprocket. The small sprocket drives a large sprocket on the front wheel, which has a coaster brake so that when the power is off the bike will free wheel. Motor speed is controlled by a rheostat on the handlebar and draws approximately 18 amperes when turning at 1800 r. p. m.

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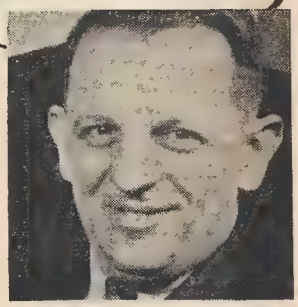

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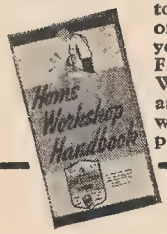

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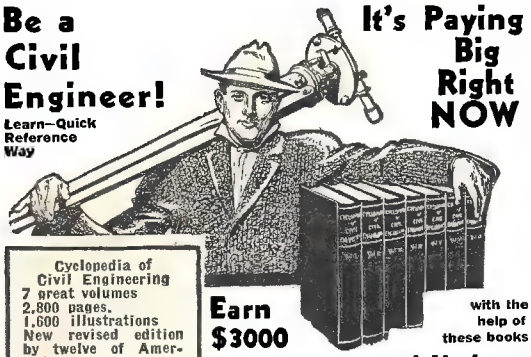

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Editor's Workbench Chips

[*Continued from page* 21]

Sub detectors are fine when they are used; my own guess is, simply, that someone was asleep at the switch, and I mean "switch" in a technical, not figurative sense. Once their presence is detected, submarines become pretty helpless, because depth bombs exploded even a considerable distance away crush their egg-like shells or at least open their seams. The concussion is terrific and is transmitted under water in all directions, so accurate placement of the bombs isn't necessary.

***

Our vocational series of articles starts off in this issue. We believe, with pardonable pride, that this is one of the most informative and valuable features ever offered in MI, or, for that matter, any other magazine.

We want to give you what *you*, the reader, wants—so, if you have any particular vocation in mind that you'd like to know more about, drop us a postcard or a letter and let us know about it.

***

A tip to boat builders who submit pictures to this department: Don't forget to make some views of the boat while it is still in construction. These are sometimes more interesting than the finished job. If you're working indoors in the garage or basement, you can make good pictures with the aid of inexpensive flash bulbs.

***

Thirty-five years ago William King of Brownsville, Texas, decided that he could make some money by catching rattlesnakes and selling them to zoos, circuses, and snake acts. Today, known as "Snake" King, the gentleman has a thriving business, his place at Brownsville being one of the largest commercial reptile farms in the world.

To get the details of Mr. King's success, read his saga of success in our February issue—"Do You Want To Buy a Rattlesnake?"

***

I wonder how many of you appreciate the importance of the advertisements that appear monthly in MI? Our advertisers offer a wide assortment of booklets and pamphlets that contain some really valuable and useful information. For the cost of the postage alone you can acquire a miniature library! One of the most useful little books in my own shop is a saw manufacturer's catalog, which has a lot of handy "dope" in the back to which I refer constantly. Wise up; clip some of those coupons and mail them out today!

—*Robert Hertzberg, Editor.*

The Great Train Wreck

The picture at the top shows the Canadian Pacific freight crossing the trestle on a regular run. The picture below shows the same train immediately after the wreck which threw engines and cars into the gulley below.

If you're wondering how the crew fared, stop worrying—the train is a model! These pictures were posed to give the impression that the train was real, and it's a good job if you ask us. The telegraph poles are five old broom handles strung with cotton thread, and a small maple bough, cut into short lengths, created the illusion of "logs" for the pole car.

The forest in the background is in reality a clump of weeds and the engine smoke is from a cigarette.

The bluebird, purple martin and house wren used to be grouped as "house birds" because of an idea that they were about the only birds that would readily nest and feed near human homes; but with encouragement many other species have proved neighborly to man.

A new kind of warfare against forest fires consists of organizing fast-working crews, each axe man taking "one lick" and moving on for the next man to take his lick, after which come similar crews with hoe and rake and finally shovel crews and patrol men, all using the rapid "one lick" technique.

A zoologist calls the Capybara of South America the most friendly and gentle of wild animals, although this four-foot-long rodent has front teeth strong enough to cut corrugated iron.

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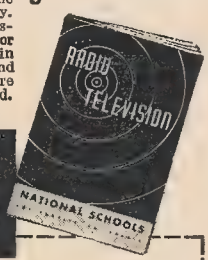

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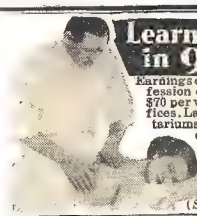

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Scientific Discoveries May Eliminate Causes Of War

Scientific research can eliminate the economic causes of war, Dr. Karl T. Compton, president of Massachusetts Institute of Technology, noted scientist and a member of the newly-created National War Resources Board, told the American Chemical Society.

"Science can never overcome the desire which some men have for domination," President Compton declared. "It cannot remove ambition and envy from the human breast. But insofar as wars may be induced by economic considerations, science may do much to remove the causes."

Outside of sheer domination wars come because one nation wants the economic resources held by another. Great Britain wants oil and food which the British Isles cannot produce. Germany and Japan want rubber, foodstuffs and mineral resources. It is from these and similar wants that modern wars spring, Dr. Compton said

The necessities for these economic needs of nations can be taken care of by scientific research, Dr. Compton continued. Synthetic substitutes can be created at a cost far less than a major war and within a time far less than that in which the effects of a major war can be recovered from, he said. "At the same time this could be done not only without hurting anyone but with great indirect benefit to all concerned."

As examples of substitutes already known, Dr. Compton gave:

1—Synthetic gasoline from coal. Coal sources are much more abundantly distributed throughout the earth than are petroleum fields.

2—Synthetic rubber can be made for automobile tires and the countless other uses of rubber out of raw materials such as air, coal, limestone and water that are widely distributed.

3—"Chemical agriculture" growing an abundance of food in tanks and other compact places can overcome the fear of nations about their food supplies.

4—The development of lacquers for the interior linings of food containers has overcome the fears of the U. S. about stoppage of Bolivian tin supplies.

"A good deal has been said about the ways in which science has been applied to make warfare more destructive, just as science has also been applied to bring about a certain compensating degree of protection against new weapons. . . . Far more significant than these is the use of science to remove some of the major causes of war," Dr. Compton declared.

New tests indicate that there is less radium in sea water than earlier investigators believed.

About 70 of the national forests in 20 states have winter sports facilities.

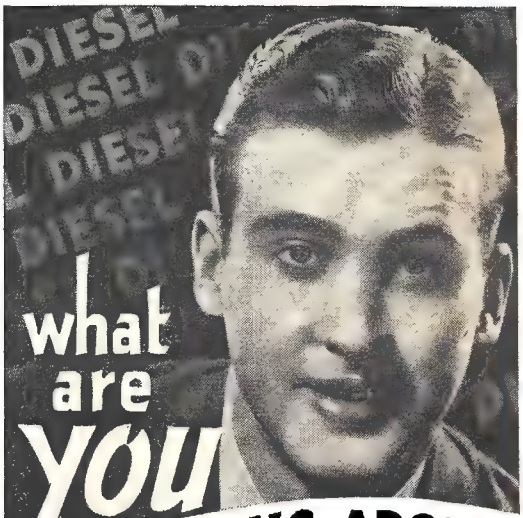
Night Driving Made Safer

Developed by J. B. Feldman of Philadelphia for use by police departments and traffic courts and also for use in periodic tests of operating personnel by corporations who operate taxicabs, buses, street cars, railroad trains, airplanes, passenger boats and so forth, this instrument provides a quick, sure test for the extent of night blindness, or hemeralopia, an eye defect which causes many traffic accidents and which is said to be often caused by a deficiency of vitamin A in the diet.

Night blindness is the inability of the human eye to readjust itself quickly to normal sight after exposure to light. All persons leaving a brightly lighted foyer and entering the darkened auditorium of a theatre experience a sensation of temporary blindness. Normal eyes quickly readjust themselves but eyes afflicted with night blindness require a much longer period before they can see in the darkened auditorium.

In a recent study by Pennsylvania State Police of 77 night accidents, a total of 48 accidents, or 62%, were found to have occurred in the "night blind" group of drivers. In making an examination for this eye defect, in a darkened room, the subject looks directly into the bright high-intensity light in the top rectangular window for a period of three minutes, while the operator watches the patient's eyes to see that they are kept open during the slightly uncomfortable but harmless test. At the end of three minutes, the bright light at the top is shut off and the patient then immediately looks below into a smaller oblong aperture through which a dimly lighted arrow may be seen. To avoid possible deception, the operator can rotate this aperture so that the arrow points to right or left or up or down, and the patient then reports the instant the arrow becomes visible to him and states the direction in which it points.

The length of time required to see the arrow is the basis for measuring the degree of night blindness.



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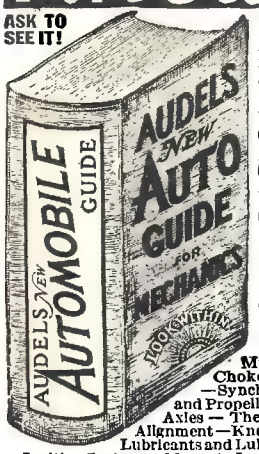

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New Cars Hard To Service Says Maintenance Engineer

The plaint of many a private motorist, that the maintenance cost of his automobile is continually on the rise, was echoed at the meeting of the Society of Automotive Engineers by Ellis E. Templin, maintenance engineer of the Los Angeles Water & Power Department.

Armed with cost figures from his department, Mr. Templin, while praising the cars, listed the following maintenance complaints, urging discussion and improvement:

1. An eight-cylinder car in the medium price field required in 1932 7½ hours to replace all main bearings and the oil pan. Today it takes 17 hours to do this same job. To replace the timing case cover on this car requires the mechanic to remove the radiator and takes 3¾ hours instead of 3 hours as formerly.

2. On a six-cylinder, one of the "Big Three" in low priced field, a complete overhaul now takes 50 hours. Formerly it took only 38 hours. To remove, inspect and replace the rod and piston assembly on this car now takes 6½ hours where formerly only 4¼ hours were needed. Such a simple thing as a front fender replacement now takes 2 hours 15 minutes, whereas it used to require but an hour and 45 minutes.

3. Another six-cylinder car now needs an hour and a half to service shock absorbers. It used to take a half-hour. Replacing a windshield now takes three hours and formerly required half the time.

The troubles with passenger cars are no worse than the servicing of trucks, Mr. Templin added. The new cab-over-engine trucks give more loading space but increase mechanics' headaches. A current model of this type requires, for an engine inspection, that the hood be raised and the cab tilted. It takes four men to do this job and requires another man 20 minutes to take apart the units that interfere with the initial operation.

On another truck a look at the distributor system requires the removal of seats, floor boards and shift lever assembly. To get at the air cleaner, the mechanic lies on his back and works up.

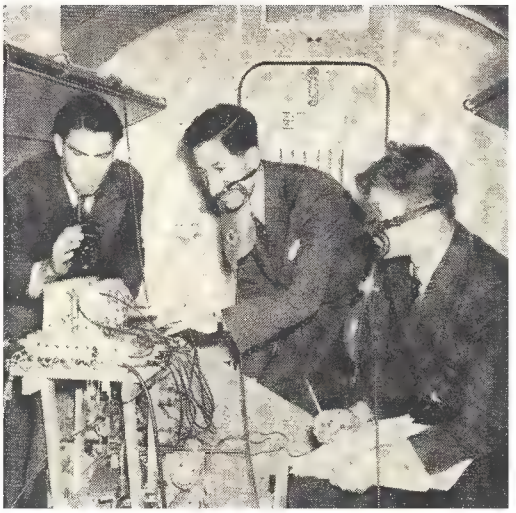
On another model, to make a valve adjustment means that a front wheel and the splash pan must be removed.

Not only does this increasing complexity mean much extra labor costs, said Mr. Templin, but it means that in servicing mechanics may neglect hard-to-get-at but vital spots and let them go until "something happens."

Chemical industry produces about 10,000 different substances that are sold; and there are another half million substances known, but without present use.

"Ghost beams" which are deceptively like radio beams when received by airplane sets are blamed for a number of airplane crashes in recent years.

Set New Altitude Record



A new world's altitude record for Douglas DC-3 transport planes was unwittingly established in Chicago during the course of a flight in which two University of Chicago scientists photographed mesotrons, the heavy radioactive components of cosmic rays, from a United Air Lines plane.

The plane climbed to 28,900 feet, breaking the previous record of 26,300 feet for ships of its type.

The 21-passenger, twin-engined airplane was piloted by Captain W. E. Larned, assistant superintendent of flying for United's eastern division, and First Officer D. Luckman. It carried W. W. Davies, United research engineer, and Dr. Gerhardt Herzog and Winston Bostick, research associates at the University of Chicago.

Captain Larned, who had no thought of trying for a record, said the ship's engines were working perfectly at 28,900 feet and undoubtedly he could have continued to above 30,000 feet.

The plane remained aloft three hours and a half and the outside temperature at the 28,900-foot altitude was 30 degrees below zero. The two scientists carried 800 pounds of equipment and the photographic plates were exposed at the highest point of the flight. All members of the party wore oxygen masks.

The flight was part of the cosmic ray investigations being carried on by Dr. Arthur H. Compton, Nobel prize winner. Professor Compton remained on the ground but maintained contact with the plane by radio. He said it would take some time to determine the scope of the revelations contained in the photographs. They were the first ever taken of mesotrons at stratosphere altitudes.

Though some chemical elements are present in plants only in tiny quantity, they are important: lack of boron may shrivel the heart of apples, and rot the tops and hearts of sugar beets.

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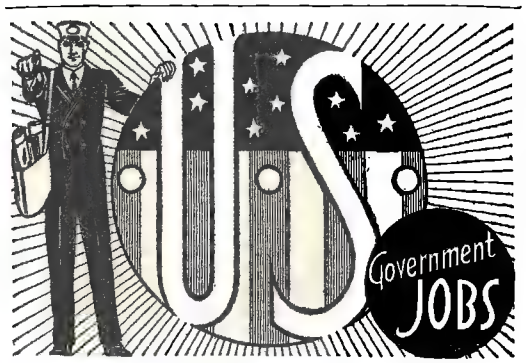

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Shape Of Man's Body Gives Hint Of How He May Die

The shape and proportions of a man's body, while he is still in good health and a long way from his funeral, give fairly definite indication of how and when he may be expected to die, Professor Raymond Pearl and Dr. W. Edwin Moffett of the John Hopkins University reported to the National Academy of Sciences.

Professor Pearl made a study of the histories of 2332 men all dead, representing the longest-lived and shortest-lived groups out of a much larger number. Information about their bodily constitution had been placed on file years before, when they were all in good health, with no indications of onset of the various diseases that finally killed them. He divided them into two classifications, long-lived and short-lived.

Among the results of his study, as reported to the Academy, were the following points:

Short-lived men who died of heart and kidney ailments were bigger around the body, in both chest and abdominal girth, than long-lived men who died of the same groups of diseases.

This condition was reversed in the case of men who later died of cancer and pneumonia: the skinny (asthenic) men were shorter-lived than the stouter (pyknic) type.

In those eventually dying from cancer and from diabetes the average body weight was also greater in the short-lived than in the long-lived group. The difference here, however, was too small to justify any very definite conclusions.

Height apparently had nothing to do with length of life. Talls and shorts were scattered at random through all the disease groups, among both long-lived and short-lived.

Pulse rate was more rapid among all groups of short-lived than it was among the long-lived groups.

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Streamlined Stoves For Army

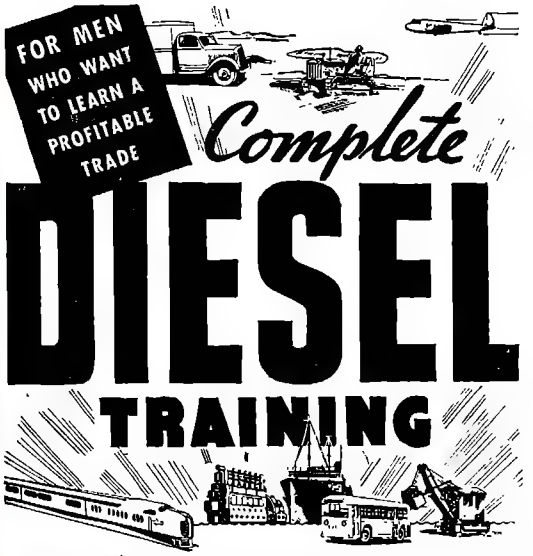
Streamlined divisions of the American Army, moving across country at high speed, aren't going to outrun their dinners. Contracts have been let for 667 new-type field ranges, designed by Army Quartermaster officers, able to follow the troops at any speed they may travel, serving them with fresh, hot meals three times a day.

The ranges are so set up that a single one can serve a small independent unit, or any desired number can be massed for larger bodies of troops. All kinds of cooking, from frying an egg to roasting a huge chunk of beef, can be done while the range is rolling along the road.

Fuel is normally gasoline, to keep smoke from betraying the movement of troops to watchful enemy observers. However, wood can also be burned where smoke doesn't matter and the expensive liquid fuel can be saved.

Synthetic wool made from casein, by-product of milk, is found capable of taking the dyes used in coloring real wool.

A botanist has found a way of heating plant specimens to kill insects, without drying out the plants too much.



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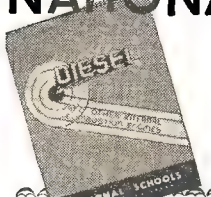

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Foreknowledge of Weather Aids Britain And France

Weather, which regularly migrates from west to east, is proving an ally of the Allies in the present war, as it did in 1914-1918. Britain and France know what the weather is going to be like over Germany before the Germans themselves know, and can plan their military operations accordingly.

The British and French have this private foreknowledge of German weather because they get the same weather first. Storm centers and areas of fair weather that eventually reach Germany cross Britain or France on the way, or at least some stretch of ocean patrolled by Allied warships and open to non-German commercial shipping, from all of which weather information can be obtained for Allied use but denied to Germany.

To be sure, German submarines may possibly be sending weather information home by radio, but that would be a risky procedure, with British and French destroyers and aircraft constantly on the alert to pick up any hint of a U-boat's whereabouts. And if the anti-submarine campaign succeeds completely, as the British Admiralty claims it will, even this slender source of weather information would then be lost to the Reich.

In the meantime, every effort is being made in Britain to deprive the Germans of any possible crumb of weather information. Publication and broadcasting of weather data are strictly forbidden; not even the occurrence of a local thunderstorm may be mentioned. Public forecasting in the islands has undergone a complete black-out, lest the enemy glean any helpful information from it.

Weather knowledge has become of immense value in war. Before a major offenseive is launched the general staff wants to be assured that it will not bog down in mud. Before an air raid takes off, or a naval move is undertaken, the chances of storm, cloudiness, fog and high wind must be determined. Chemical warfare is notoriously dependent on wind and the chances of rain. Meteorologists have taken the place of the augurs and soothsayers who used to go with the armies of antiquity.

Accounts of the successful British air raid on the Kiel Canal area indicate that it was timed on a knowledge of weather probabilities. The pilots' stories of taking off in clear weather, flying into rain, and swooping out of clouds to loose their bombs on German warships and shore works all suggest rather strongly that English weather men knew where a helpful storm area might be centered.

The converse of this story is one from World War days, of a pair of Zeppelins that started from their German base in what looked like good flying-and-bombing weather, but ran into a storm of which they had no warning and were both lost in the North Sea.

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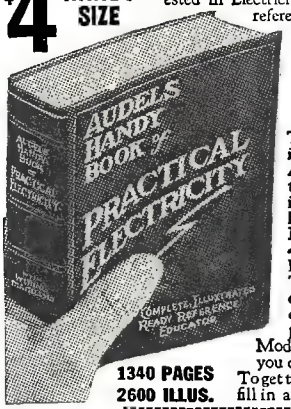

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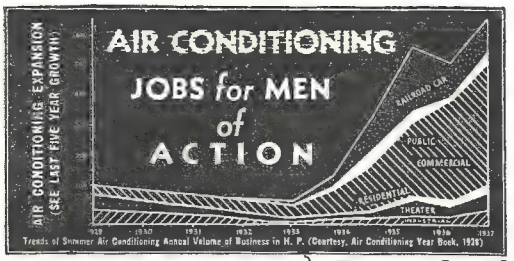

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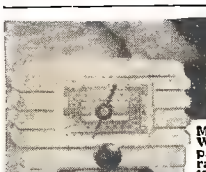

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Snakes, Lizards Can't Stand Much Sun, Experiments Show

For all their reputations as the world's No. 1 sun-bathers, lizards and snakes "can't take it" when the sun gets really hot. Experiments demonstrating this were carried out by Dr. C. M. Bogert and Dr. Raymond B. Cowles while they were on a reptile-collecting expedition in the Colorado Desert of California. Air temperatures during midday ran above 100 degrees most of the time, and the rocks and sand underfoot were of course much hotter.

The two men prepared cages for the reptiles they caught, providing each with an artificial burrow in the shape of a piece of clay pipe sunk in the ground. The cages usually appeared deserted during the hot part of the day.

In the most striking of their tests the men deliberately exposed lizards and snakes to high daytime temperatures. Perhaps the most dramatic was what happened to a normally nocturnal species, the granite night lizard. When released in the shade, this lizard dashed away from its captors into the full sun, where the temperature was 135 degrees. "It stopped abruptly, opened its mouth and succumbed almost immediately."

A day-roving snake, the red racer, reputed to be the fastest of all serpents, fared ill when it was released under the full glare of the sun on a shelterless dry lake bed, where the ground temperature was 122 degrees. It slithered along for four minutes, then stopped short, and in two more minutes was dead.

Experiments on other species of lizards showed them not quite so susceptible to sun-exposure, yet some of them became paralyzed after only a few minutes out of the shade. The chuckwalla lizard, supposed to be a particularly sun-loving animal would venture out of the shade, snatch some flowers to eat, and then get back into shelter again, in less than five minutes.

Lizards well known ability to change color is only partly a "camouflage reaction," Dr. Bogert believes. The hotter the sun and the greater the glare, the lighter an exposed lizard will turn; cold, on the other hand, causes lizards to become lark. These changes, in the Museum scientist's opinion, have to do with desirable differences in light- and heat-absorption: the light phase protects by reflecting, the dark phase helps raise body temperature by absorbing heat.

A new plastic compound cheaper than anything on the market has been developed from the agricultural waste product of sugarcane known as bagasse,

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At least 5,000,000 persons in the United States ave now been treated with the new and often life-saving chemical remedy, sulfanilamide, it is estimated.

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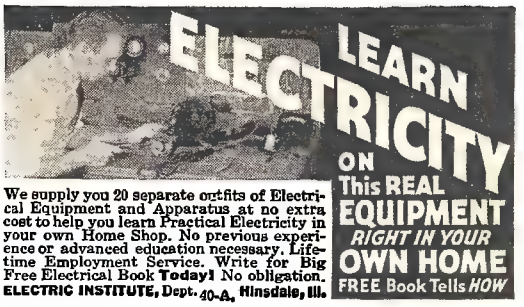

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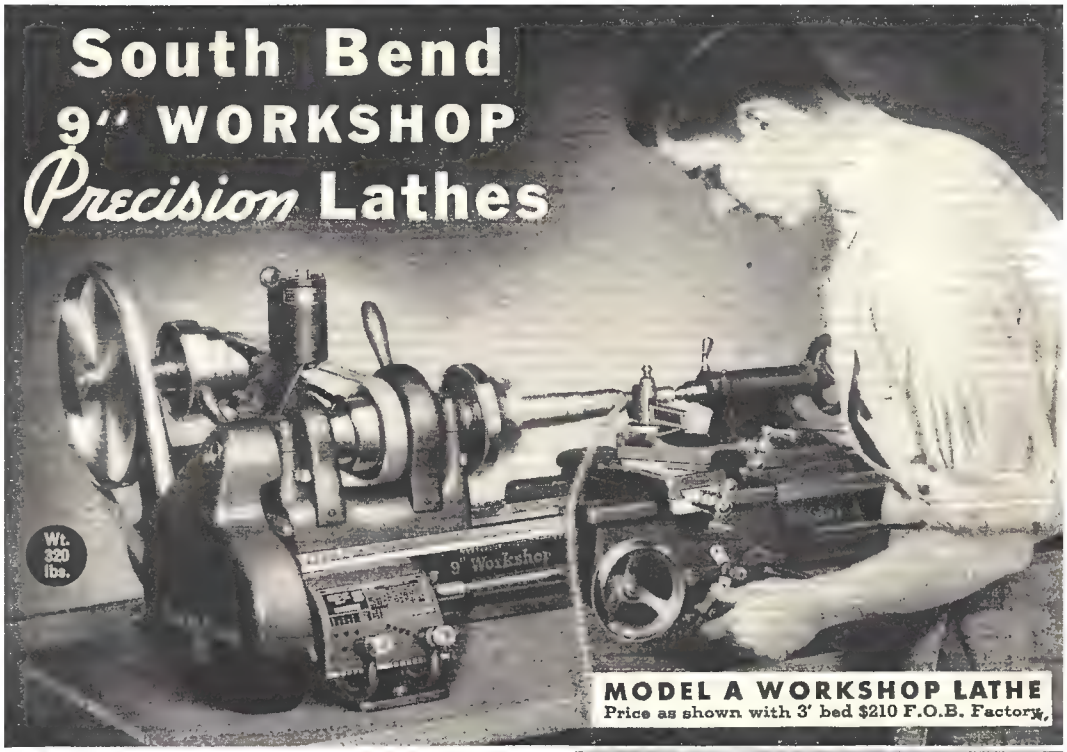

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Three Models

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To meet the requirements of every type of shop, South Bend 9-inch Workshop Back-Geared, Screw-Cutting Lathes are now made in three models; with bench or floor legs; motor drive or countershaft drive.

MODEL A has full quick change gear mechanism, making all threads and feeds instantly available, also automatic apron with friction clutch for operating power cross feeds and power longitudinal feeds. This is a practical lathe for light manufacturing and accurate tool work.

MODEL B has plain change gear equipment for threads and feeds, also automatic apron with friction clutch for operating power cross feeds and power longitudinal feeds. This lathe is recommended for laboratory and instrument work.

MODEL C which we have been manufacturing for over five years has lead screw and half-nut power longitudinal feeds. This popular model is the same as Models A and B, except that it does not have the gear box and the friction clutch in the apron.

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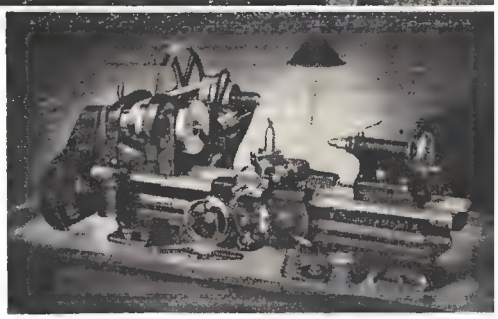

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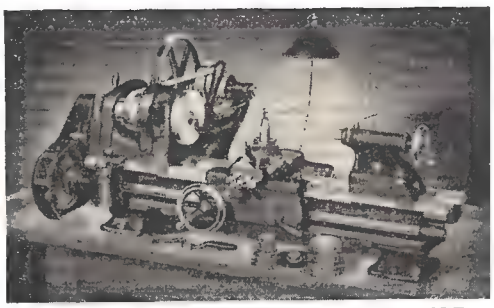

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MECHANIX ILLUSTRATED

W. H. FAWCETT
Publisher

Vol. XXIII
No. 3

January
1940

Your Job

AUTO MECHANIC

MECHANIX ILLUSTRATED presents the first in a series of vocational analysis articles designed to help you choose the job best suited to you. No one except yourself—not even parents—can choose for you the work at which you will spend a lifetime. You may already be working at some job unsuited to your real talents. The facts presented in these articles are drawn from outstanding authorities in their fields, the tests carefully designed to reveal your real talents as well as to help you in analyzing them.

Take the aptitude tests and study the rewards and demands of various occupations which MECHANIX ILLUSTRATED will analyze each month. You will then be equipped to choose your career on a basis of real understanding of the job and of yourself. You will be able to guard against becoming an unhappy square peg in a round hole.

Next month the occupation of Radio Servicing will be discussed.

by
Donald G. Cooley

There is no small amount of office work for a mechanic.

SO YOU want to be an auto mechanic! It can safely be assumed, then, that these things are true about you: You know too much about tools to fall for that ancient gag about the left-handed monkey wrench. You know that the clutch is not the last scene in a movie but a link between engine and transmission. You don't mind dirtying your hands with the soil of honest toil. You would rather tinker with a jaloppy than write a sonnet. You feel that "grease monkey" is as honorable a professional title as bachelor of entomology, and perhaps you remember that Walter Chrysler and William F. Knudsen and Henry Ford were skilled mechanics in their day.

You have plenty of other character traits,

A good auto mechanic, like a doctor, must be able to diagnose, treat, and prescribe the proper remedies for the ailing patient.

Lubrication is one of the specialties a good mechanic must know inside out. Here an auto mechanic is shown using a portable high pressure pump on the car's steering knuckle. *Alemite Division, Stewart Warner Corp.*)

Left: A crackerjack mechanic must be able not only to fix up a car's innards, but to beautify it externally, as well. Here a mechanic is using a paint gun on a car door. (*Picture Courtesy of Pontiac Division, General Motors Corp.*)

which will be taken up later, that would make you a good mechanic. But unless the above is a fairly accurate picture of you, you really don't want to be an auto mechanic at all.

It's gray matter in the braincase rather than wrenches in the tool box that makes a good mechanic. Thomas A. Edison was a good mechanic long before he won fame as an inventor. One day Edison, then a young man, dropped in at a publication office and saw a group of perspiring mechanics feverishly trying to repair a complex recording machine which had broken down. He took a casual look at the machine and caught the boss's eye.

"I think I can fix that up in a minute or two," said Edison.

The worried boss, willing to try anything, told him to go ahead. Edison's hands were in his pockets. One of them came out holding a small pair of tweezers. Deftly he reached down, closed the tweezers on a loose contact spring which had fallen into the cogs, and pulled it out. The machine instantly went whirring about its business.

As an auto mechanic, you will be paid as much for what you know as for what you do. There are, perhaps, too many auto mechanics, as there are too many men in most occupations—but there aren't enough *good* ones.

Let's strip this business of auto mechanic right down to its chassis. In the last census, 394,169 men gave their occupations as auto repair work. That is more than any other skilled trade except carpenters, machinists and painters. You know as well as anybody that the automobile is here to stay. Transportation by motor truck is increasing; car registrations are increasing. Even during the depression, although wages dropped and some mechanics were laid off, the employment

Test Your Aptitude For the Vocation of

AUTO MECHANIC

Give each of the following questions careful consideration—do not answer hastily—then check "Yes" or "No" in the proper column.

	Yes	No
Do you like to figure out problems and puzzles by yourself?		
Would you rather work with things than with people?		
Do you value accuracy above speed?		
Are you a "handy man" around the house, making repairs, etc.?		
Do you like to tackle jobs where you have to work alone?		
Are you able to take orders from superiors and carry them out without supervision?		
Are you patient and steady-nerved when working under trying conditions		
Can you understand simple diagrams and read technical books intelligently so you can always keep on learning?		
Do you have a home workshop, or own or have use of a few essential tools?		
Have you picked up a store of varied information on tools and common mechanical objects?		
Do you like mathematics—arithmetic, algebra, geometry?		
Were most of these subjects among your favorites at school: general science, physics (electricity, mechanics), chemistry, mechanical drawing, manual arts?		
Do you have an active hobby which requires skilled and patient handwork, such as model making, wood working, etc?		
Can you drive an automobile, passing driver's license tests?		
Are you able to identify a majority of the 1939 cars at a glance?		
Can you explain the function of all of the following: differential, chassis, distributor, clutch, transmission, crankshaft, carburetor, ring gear?		
Do you have average physical strength and endurance for working on your feet, hours at a stretch, on concrete floors?		
Is your vision satisfactory for close work?		
Do you have enough finger dexterity to work with small parts in close quarters?		
Would you be willing to earn less as an apprentice, while learning the tricks of the trade, than you could earn as an unskilled laborer?		
Do you feel that the mechanic's trade would make use of, and satisfy, most of your abilities?		
Would a mechanic's income be adequate for your standards of living, at least as a stepping-stone to something better?		
Would the company of your fellow mechanics be congenial to you; would you be interested in the same things they are?		
Are you reasonably sure that you have no physical or temperamental handicaps for the mechanic's vocation?		
Do your friends think you would make a good auto mechanic?		

TO SCORE YOURSELF, count 4 points for every "Yes" answer; "No" answers count 0. If you have a score of 80 or better, you should seriously consider auto mechanics as a vocation; if your score is lower, another occupation is probably more congenial to your abilities.

level was above that in many other fields.

So you have a big "yes" to the question, "Is this field a growing rather than a dying one?"

Moreover, the skilled auto mechanic, an expert on internal combustion engines, can step into associated specialties. He has a splendid background for Diesel engine work. He can step into the booming airplane engine field by study and experience which will enable him to win Department of Commerce licenses. He is more or less independent of geography, for any hamlet large enough for a filling station needs auto mechanics.

Depending on the section of the country in which you live, the mechanic's work is more or less seasonal. In colder regions there is a peak business in winter conditioning of cars which sets in with the first frosts. The days when the car was propped up on horses in September and restored to service in May have vanished along with side-winding cranks. Spring and summer, however, do bring an increase in repair work along with a bulge in vacation travel.

Suppose you are a mechanic reporting for

Straightening out dented fenders is a job a mechanic is often called upon to do. Here one uses pneumatic hammer.

work. You check in and the foreman hands you a repair order, or perhaps simply says:

"Frank, grind the valves and check the ignition timing on that Packard. The water pump needs repacking."

From then on you are on your own. You are in the same position as the hiker who meets a grizzly bear on a one-way trail. You have to solve your own problem. The mechanic is an individualist; he stands on his own feet and he can't be forever running to teacher when he is puzzled.

How would *you* stack up as an auto mechanic? The aptitude test on page 37 will enable you to judge your qualifications. There are psychological testing services which you can use to amplify this brief test, if you wish. The Stevens Institute at Hoboken, N. J., most large universities, and many local organizations such as the Y.M.C.A. offer more detailed tests of psychological aptitude. Many of them are offered for a moderate fee. Your local Board of Education will advise you of vocational counseling services that may be available in the high schools or other

BALANCE SHEET

for assaying auto mechanic's trade

ASSETS	LIABILITIES
Work offers variety; not monotonous	Long working hours on your feet
Opportunities widely distributed	Vacations uncertain
Unemployment not serious problem for skilled man	Takes at least two years (more often four) to become skilled mechanic
The industry is growing	Can become a "dead end" job unless you are competent and energetic enough to prevent it
Can set own working pace	May not throw you in daily contact with the type of people who could best help you advance; i. e., executives, owners of business, etc.
Remuneration fair to good	On the subjective side, you will have to answer honestly whether the idea of working in overalls and getting your hands greasy is distasteful
Reasonably easy to get a start	
Can lead to setting up own business	
Skilled mechanic is versatile; can turn talents to advantage in many ways if necessary	
College courses unnecessary	
Excellent background for advanced study in certain technical professions	

THE OCCUPATION CAN LEAD TO:

- Aviation mechanics
- Diesel engine specialty
- Shop foreman's job
- Your own business
- Managing service department of car distributor
- Selling automobiles
- Factory employment with large manufacturers

organizations of your own community.

Let us suppose that you make the grade on the MECHANIX ILLUSTRATED auto mechanic test. You have enough manual dexterity to work swiftly and efficiently with small tools in tight corners. More important, you have some of the qualities of a Sherlock Holmes. You have patience and thoroughness and the ability to follow clue after clue until you arrive at the answer of why a balky motor won't start. If puzzles bore you, if you give up easily, if you are unhappy unless you are working with a group of people—heed the danger signals.

You don't have to be a Man Mountain Dean or a weight-lifter to be an auto mechanic, but you should have average physical strength and good endurance. If you get the sniffles when you stand in a draft, remember that most repair shops are not too well heated or ventilated. You will do a lot of standing on concrete floors. You will lie on your back on a "creeper" while you operate on a car's stomach—an art, in its own way, like that of Michelangelo painting a ceiling. It's not a job for weak sisters. Mechanics are men, and glad of it.

You can be the best mechanic in your state and it won't do you any good unless you can put your talent to work—which brings us to the next question: "How can I get a start in the trade?"

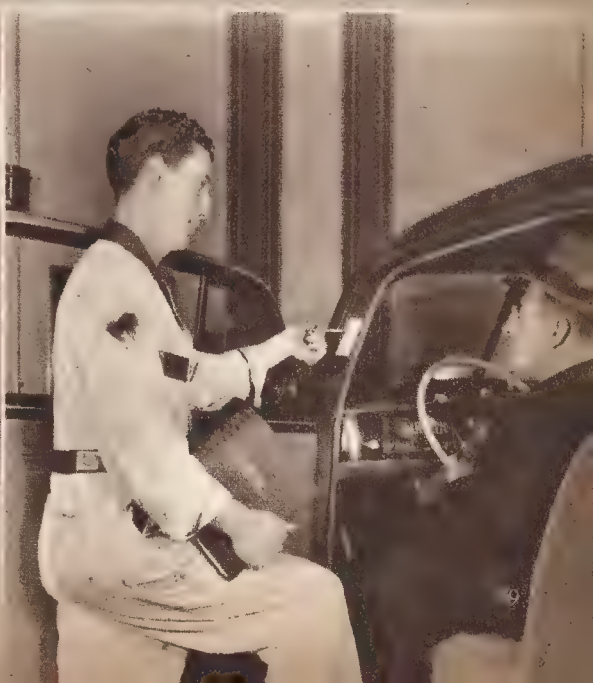
It isn't hard, but neither is it quite as easy as falling off a log—especially if you have a yen to start at the top. The easiest kind of job to get is that of greaser, washer, and

[*Continued on page* 118]

Income Chart for AUTO MECHANICS

These figures are averages, compiled from a number of authoritative studies of mechanic's wages. Conditions in your own community will determine actual income. Where two figures are given to show income range for the same type of work, the lower figure is the one most likely to prevail.

Beginners, first year or two	per week	$10 to $20
	per hour	25c to 30c
Advanced beginners, with at least two years experience	per week	$25
Skilled mechanic (takes four year apprenticeship to achieve this union rating)	per week	$28 to $48
Union wages for skilled mechanics	per hour	$1
Small non-union shops, mechanics wages range between 40c and 90c an hour —average	per hour	60c to 70c
Specialists (ignition experts, etc., who in addition to learning the trade have acquired extra experience or done extra studying to achieve exceptional skill in some branch of the field)	per week	$45 to $75



Above: Analyzing a motor is one of the mechanic's duties. Right: A good mechanic's advice is respected by customers.

Safe In The Doghouse

OVER in England they are making elaborate plans for taking care of animals that may be injured in air raids, and many depots have been opened to deal with a rush of patients. One protective device is this gas proof box in which an animal can operate his own air supply. Each movement of an animal inside one of these boxes, including ordinary breathing, draws in air through filters between moving boards.

Prisoners Must Behave Now

A HANDCUFF belt to keep dangerous prisoners under control has been adopted by the police department of Cincinnati. The belt has an inner lining of thin steel to prevent its being cut. Once fastened in it, a culprit is unable to use his handcuffs to assault his guard and can be transported safely in an auto by one man.

Nazis Listening For Pamphlets?

LIKE some strange device at an amusement park is this giant air raid detector, shown also on the cover, which has been set up in Berlin to give warning of the approach of hostile bombing planes. German soldiers with earphones sit around it on seats like perches and turn its sensitive receptor in all directions to probe the dark skies for the hum of powerful engines.

He Toasts The BIG SHOTS

LOUIS STRAKES, artist, draws the attention of passers-by to his sandwich shop by carving from toast caricatures of celebrities for display in the shop's windows, as in the photo above. At right, left to right, New York's Governor Lehman, President Roosevelt and New York City's Mayor LaGuardia are toasted, and below, Strakes is shown, putting the finishing touches on a toast statuette of the Duchess of Windsor.

Everything But Bank Night

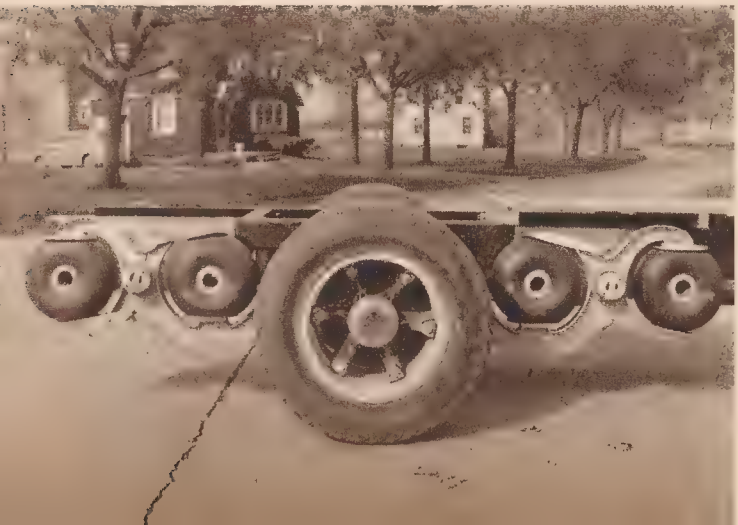
Above: A home audience watches the movies, which have been blurred out momentarily by the camera's flash bulb. Right: Shaw lowers phonograph's electric pick-up to play before-the-show music. Behind him is the microphone he uses to explain scenic movies, etc. Below: Shaw's 3-year-old son, Wayne, for whom the theatre is named, straightens the wig of one of the musicians. The loud speaker appears in the middle of the orchestra pit.

WHEN Earl Shaw, of Indianapolis, Ind., exhibited amateur motion pictures in an ordinary room of his home, he discovered that lack of theatrical atmosphere was a serious drawback. So to get his audience into the proper mood to appreciate the show, he built an elaborate miniature theatre containing all the latest gadgets, including curtains that open and close by electricity, music furnished by phonograph records and a loud speaker system, chimes that announce the start of the show, and an entire orchestra of miniature figures carved from wood and having wigs of real human hair. The loud speaker is located under the orchestra pit, adding to the effect.

Shaw operates everything electrically from a complicated control panel which has nineteen wires running from his projection stand to the screen.

Last Word In Airports

EQUIPPED with every up-to-date device known to aviation, New York's $40,000,000 North Beach Airport is now in operation. This giant field has six huge hangars, runways more than a mile long, and employs a permanent staff of 3,500 to 4,000. Above is a view of the airport from a plane flying over it. At right is the Administration Building.



Like Floating On Smooth Air

A NEW type of pneumatic air spring, made of four small airplane tires, has been patented by Clem Branstrator, Indiana inventor. When used on trucks these springs make a load practically jolt-proof and prevent spinning of rear wheels on dry surfaces. Savings up to 25 per cent in wear on tires are claimed for them.

Blood Detectives Solve

A detective tests the stains on a shirt found near the scene of a crime to learn if it is blood. Unlike the master sleuths of fiction, today's detectives need more than a quick glance before they will mutter knowingly: "Aha! Blood!"

Left: Taking dried blood from nail holes in a rubber heel found near the scene of a crime. When captured, the criminal can lay his conviction to either "the fatal step" or "putting his foot into it."

A CRIMSON smear on the garage floor near the body held the horrified attention of spectators at the scene of the crime.

"Blood!"

But when the detectives came, they gave the bright splash of red hardly more than a casual glance. They searched carefully for the fatal knife, and failing to find it, closely scrutinized three tiny, reddish-brown spots on the cement near the door. Then one of them took a glass atomizer from his bag and stepped out into the darkness. Squatting beside the driveway, he shot a fine mist from the nozzle, spraying back and forth upon the grass.

Suddenly a dim blue glow flickered momentarily among the grass roots. Another puff of spray brought a gleam of intense turquoise blue in the darkness. *Blood*—shining by its own light, generated through the strange reaction of "chemiluminescence!" The liquid in the atomizer was "luminol," synthetic substance recently found to yield an intense blue light when brought into contact with blood. On hands and knees, across the adjacent lot, the detective followed the weird trail, which led finally to a side road where tire prints in the dust showed a car had stood. These prints, dovetailing neatly into other evidence, established one suspect's presence at the scene of the crime and led eventually to his confession. The mysterious bright red spots turned out to be nothing but old paint smears.

Unlike the master detective of fiction, who took one look at the bright red spots on the floor through his trusty magnifying glass and exclaimed, "Aha! Blood!" and followed this clue directly to the solution, the modern sleuth realizes it's not that simple. He knows that whatever they may be—fruit juice, red paint, lipstick—they aren't blood. Blood spots are sometimes dark red, chocolate, or even green, but never bright red. He's more likely to

Crimes

A single drop of blood is enough to give present day detectives the all-important clue that will break a case.

by Maxwell Grant

What kind of blood is it? A blood detective testing the reaction of unknown blood with rabbit blood that has been immunized against a certain kind of animal or human blood to prove its identity.

Left: Luminol, squirted from an atomizer, glows an eerie bluish-green in the dark when it encounters blood. A far cry from the hawkshaw of story books who needed no other aid than that given by a magnifying glass!

suspect olive-drab markings, or to look for blood stains where they are invisible, having been washed off.

Not long ago, a heavy overcoat, found in the back of a suspect's car, was flung upon the police chemist's laboratory bench by detectives who asked, "Can you find any trace of blood on this coat? We're sure we've got the right man but he denies ever having touched the body."

"From the way the lining's shrunk I'd say it looks as if he'd washed out any blood that was on it," observed the chemist, "but let's see."

He touched the coat at various places with phenolphthalein, sensitive indicator which turns color if blood is present, even if only one part in ten million. At one point a trace of color appeared, but the chemist was doubtful. It might have been blood, he said, and again it might have been some stain such as a compound of copper, which sometimes reacts in the same way.

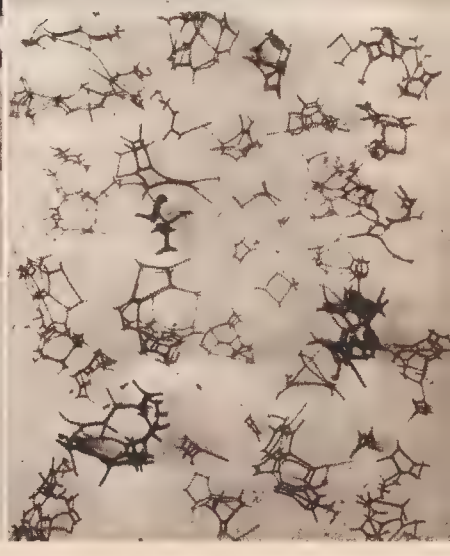
He moistened the coat with water, let it stand a few minutes, then wrung it out, collected the fluid, and heated it in an evaporating dish. When he had concentrated it to only a fraction of its former volume, he picked up a little with a piece of white blotting paper, and added a drop of sour-smelling fluid—benzidine dissolved in acetic acid.

Instantly a bright blue spot began to spread as the drop penetrated the paper.

"Your man knows more than he's telling," dryly commented the chemist, and when this evidence showed his denials were useless, the

Making microphotos of blood cells to determine whether they are animal or human. No device of science deserves more credit than the microscope for breaking "cast-iron alibis" and solving "perfect" crimes.

Above: Human blood heated to 700°
Below: This same blood at 900°.



suspect talked. So the modern detective knows that blood can tell many things. He looks for weird radiations in the dark; symmetrical, snow-flake-like crystals of burnt blood surprisingly resurrected among drab ashes; spectroscopic glimpses of sinister greenish-brown smudges staining the rainbow image of the spectrum; or egg-like cells on the microscope slide, proclaiming the innocence of a murder suspect. These are some of the newer keys by which modern crime fighters are unlocking the secrets of blood.

Recently an astonishing discovery gave a new method by which even fire is robbed of its power to wipe out telltale blood stains. Its discoverers were examining ashes with a microscope when they noticed certain mysterious crystal-like structures, resembling the atom models made by physicists with beads and wires. Drs. A. M. Moody and Jessie Carr of the University of California Medical School, and Dr. Frederick Proescher of the Santa Clara County Hospital had been consulted in a murder case in which a short length of pipe, found in a backyard incinerator figured prominently. Its crusted, fire-pitted surface gave no helpful clue—until the discovery of those puzzling shapes among the ashes. They were far too large for remnants of individual blood cells—yet what could they be?

Seeking to reproduce these strange formations and learn their meaning, the three doctors now set out on new research. In a local steel mill they secured the use of high-temperature furnaces used in heat-treating metals. Working week-ends when the mill was shut down, they began running tests on every imaginable substance—blood of sheep, cows, chickens, pigs, chopped vegetables, leather, wood, and an endless variety of other materials, organic and inorganic. Then came a strange discovery. When a small quantity of *human* blood was heated to 500 degrees, there appeared the mysterious ring-like structures! The mystery was solved.

To simplify the method, Dr. Moody pricked

his finger, squeezed a drop of his own blood onto the end of a cigarette, which he then lit and smoked until the reddened tip had been consumed. Then he dumped the ash onto a glass slide and put it under a low-power microscope.

There among the shapeless ashes were more of the mysterious crystal-like structures—clearly the remnants of charred blood, in a form never before observed! Now the scientific detective can quickly perform this simple test and know with certainty if ashes from the scene of the crime contain human blood—and thanks to definite changes occurring in the blood as it is heated beyond certain points, to say exactly how hot any specimen had been—even when the blood is mixed with dirt, or diluted 1,000 times!

Microscope magic has exploded many an alibi—and cleared many an innocent man from unjust suspicion. Sometimes a suspect says the telltale spot is animal blood, thinking it all looks alike, after all. But the chemist simply slips a slide smeared with a thin film of the blood, under the microscope and looks at the red corpuscles. If they are oval and resemble fried eggs, each with a yolk-like nucleus in the center, they are probably animal cells, for normal human red cells are round and have no nucleus. But cells from certain other warm-blooded animals have no nucleus, either. As a cross-check, delicate measuring instruments are manipulated to determine the exact size of the cells. Man's red corpuscles are one-sixth larger than those of the goat, with other domestic creatures falling somewhere between.

For courtroom use, a still more accurate series of tests must be invoked in which certain reactions in the systems of warm-blooded animals are necessary.

"Sure, those are blood spots on my overalls," readily admitted a farm hand arrested in connection with a murder near Riverside, California. "Chicken blood." But other evidence implicated him directly and provided a strong motive.

In a bacteriological laboratory, a technician began preparing rabbits by immunizing them against certain types of foreign blood, injecting into each a tiny sample of the blood of a chicken, dog, horse, cow, or human being.

Twenty days later, he pricked each rabbit's

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Above: A furnace for heating blood. Left: A simple test—a drop of blood is put on the end of a cigarette and the ashes, under the microscope, reveal the tell-tale chrystals.

Melons Fall Off Water Wagon

HONEYDEW melons flavored with choice liquors resulted from an experiment carried out on the Yonkers, N. Y., estate of Samuel Untermyer by the superintendent of the estate, George Chisholm. Using port and cognac, Chisholm ran a cotton wick from each fifth-gallon bottle to an incision in a ripening plant's stem just above the roots, binding bottle and wick to the stem with grafting wax and sealing with cellophane. Mr. Untermyer is shown at left, inspecting the nearly ripe melons.

Mars Models Male Millinery

FOR Englishmen remaining at home to fight the "Battle of London" the latest idea in hat styles, which is now on the market, is a fancy looking bowler with a steel lining. A miniature anti-aircraft gun on the front gives the headpiece added adornment.

Armor For The Ladies!

IN MODERN warfare the ladies need protective devices, too. To supply a huge demand, attractive looking and comfortable bullet-proof vests are being produced, not by skilled tailors but by Wilkinson's, one of Britain's foremost steel making firms.

Snow Cruiser A Frost?

ADMIRAL BYRD'S snow cruiser, which was described in the October issue of MI, is still far from the Antarctic, yet it has already had its share of trouble. Its first breakdown, which was due to mechanical failure, occurred soon after it left the Pullman Company plant in Chicago, where it was built. A short time later, while en route from Chicago to Boston to be placed aboard Byrd's ship, it ran off a bridge in Ohio and became mired in a brook.

Tri-Motored Model Can Land Anywhere

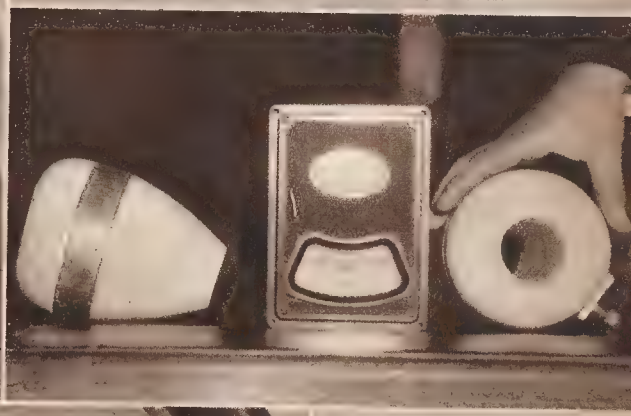
THE unusual model plane shown at right not only has three motors—count 'em—but it also can come down safely on both land and water. One of the motors is located in the plane's nose and the other two in the wings. Each generates ¼ horsepower. Special wing fittings allow pontoons to be attached for water landings and takeoffs. The model was built by Walter Benjamin, aged 18, of New York City.

How To Be Seen During Blackout

TO KEEP from getting picked off by autos during blackouts people in England resort to ingenious devices. The man in the bowler hat uses an electric torch shaded blue to warn traffic of his presence. The little dog in his black and white striped blanket is doubly protected, for not only are the white stripes easily seen in the dark but they also make him resemble a well known animal of strong odor.

Newest Glider Gadgets

Above: The ground crew pulls up to the sailplane after tracking it down by means of the two-way radio. Some of these duration flights end up hundreds of miles from the starting point. Left: This photo, taken from the pilot's cockpit of a glider, shows the location of the thermal "sniffers" on the wingtip. Below: A close-up view of thermal "sniffers." The microamperemeter in the center translates the two wingtip temperatures into relative temperatures.



Left: The radio operator in the car receives a message from the sailplane and informs the pilot how far he is from the reported position. The receiving set is located underneath the dashboard, with controls on the dash panel.

Above: As the glider comes into an open field for a landing, the "spoiler" flaps are visible on the tops of the wings, close to the fuselage. Left: The pilot says to the ground crew, "I can't stay up any longer. Come and get me."

Right: The ground crew's sending set is located in the rear tool compartment of the car. The telescopic antenna can be extended to a length of eight feet.

SINCE our recent series of articles on gliding by Richard du Pont, new gadgets to aid the sailplane pilot have come into use. The Airhoppers Gliding and Soaring Club of New York uses a two-way radio to track down its sailplane when the latter is aloft on duration flights. The radio weighs less than 12 pounds, including batteries, and operates on a five-meter wave length. The pilot transmits his position to his ground crew, which follows him around in an automobile also equipped with a two-way radio.

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Residents Crow About This Town

YOU won't find Roosterville on any map. It is located in Gig Harbor, Wash., across the sound from Tacoma, and is inhabited entirely by roosters. The birds are trained to race around a track by their owner, C. E. Shaw. Shaw has done such a good job of coaching his feathered athletes that at the sound of a gong they start from trap stalls and sprint around the track. A delicious dish of corn awaits them at the finish.

Ambulance For Two Run By Man Power

WITH the air raid threat ever present in England these days, inventors are working overtime, designing new contrivances for taking care of injured persons. Among the latest of these is a double deck hand ambulance invented by Major Harold Furber. Two men can be carried comfortably, even over rough ground, in this ambulance, which needs only one man to operate it. Its principal advantage is that it can reach places which cannot be penetrated by auto ambulances.

Now You See It, Now You Don't

A MASK for auto headlights has been designed in England to supersede the temporary screens used in the early weeks of the war. Through the mask the headlight illuminates the road without throwing a beam that would be readily seen from the air. Mrs. Kay Petrie, well known woman driver, is shown at left, holding a headlight equipped with the new mask.

Down To The Sea In A Gas Station

A SEA going service station for boats is the oil barge *Neptune,* which is stationed off the South Boston, Mass., fish pier. It is 73 feet three inches long and has a loaded draft of five feet four inches, a capacity of 20,000 gallons of gasoline and oil, and a net weight of 57 tons. The deckhouse of the barge contains living quarters for its attendants. Fire fighting apparatus and a lifeboat complete its equipment.

Motor A Midget In Monster Mould

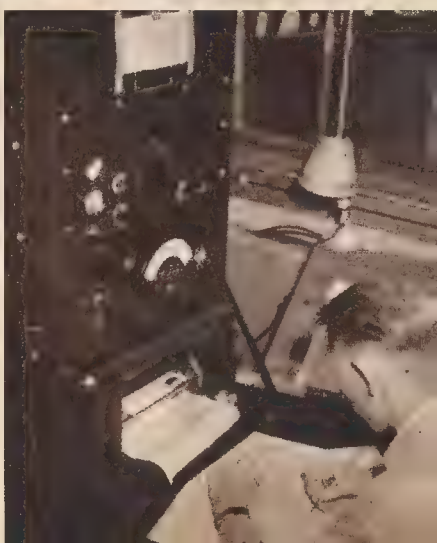
ONE hundred and seventy tons of molten metal were used in this giant cast iron mould which was delivered recently at the Vickers Works of the English Steel Corporation at Sheffield, England. The mould, which is believed to be the largest in the world, is plenty big enough to serve as a garage for a small automobile, as shown in the photo at right. What the mould will be used for has not been divulged yet, but it looks to us as if it was an ideal size for casting bombproof shelters.

It's Fun To Fall With This Device

A NOVEL gadget reduces the danger of injury or death by falls from high buildings. The worker wears a woven safety harness to which is attached a rope. The rope is passed through a shock absorber which is made fast to the building. If the worker tumbles, the shock absorber clamps down on the rope, slowing his plunge until he comes to a smooth stop.

Taming The TWISTER

Florida, long suffering victim of death and destruction dealing hurricanes, enlists science in its defensive warfare against the furies of wind and water.



The radiosonde is science's newest aid for investigating tropical storms. Observers are shown about to launch the helium inflated balloons which will carry the instrument as high as 20 miles for observations. A tiny transmitter in the radiosonde sends observations by code to the complicated receiving apparatus in the ground station below. Picture at right shows observer jotting down reports as they are received.

by Harold M. Farkas

A dramatic air view of the 1935 hurricane from disaster in the Florida Keys. A wall of ocean swept in to smash the cars and kill most of the 500 veterans about to board them.

IT WAS September, 1926, when the dreaded West Indian hurricane roared in from the Caribbean by night and staggered Florida's coral coastline. It rocked palm-sheltered Miami with crushing 160-mile winds. It lifted the angry sea from the Atlantic and flung it destructively on the unprotected mainland.

With incredible power it threw steel dredges and tankers, millionaire yachts and houseboats around Miami's rain-swept water fronts. Invisible claws of wind tore roofs from homes, crumbled towers and buildings, ripped off store fronts, killed and injured hundreds and made twenty-five thousand homeless.

The cyclonic bombardment lasted twelve hours. In that eternity of terror, the huge guns of the tropical storm raked the peninsula with deadly effect, sweeping away bridges, undermining causeways, uprooting trees, smashing windows, snapping telephone poles and tossing automobiles around with ridiculous ease.

The suddenness of the attack took even the experts by surprise. They hadn't expected the hurricane until the morning. Then, all at once, it was there, and they scarcely had time to sound the alarm, run up the warning flags and hang out the signal lanterns.

When the storm passed, Miami and its neighboring communities were pitiful reminders of the thriving resorts they had been. Dredges worked day and night digging Miami Beach out of sand and debris. This horrible nightmare of 1926 has ever since made the entire nation hurricane conscious.

The stunned inhabitants of stricken Florida rebuilt. "Surely, this wouldn't happen again," they thought. But it did in September, two years later. This time the storm tore furiously at the palatial estates of Palm Beach and upset immense Lake Okeechobee, drowning thousands.

Ever since, South Florida has kept busy

Relief workers search for bodies after the 1936 disaster in the Keys. Few homes remained standing, flimsy frame and concrete structures crumbling like this one.

Below: Diagram shows the path of the 1935 storm tracks which laid waste the Florida keys, killing hundreds and demolishing almost every house. At the bottom is shown a house which is propped to withstand hurricane winds. These props have been up since 1935.

dodging hurricanes, year after year, from middle June through November. Some have struck from the West. Some from the East. Some have been little fellows, with just enough bluster to tear up shrubbery and wrench a few awnings. Others have been severe and dangerous. All have been uncertain, menacing, keeping the weathermen on their toes and giving citizens the jitters.

When the Labor Day hurricane of 1935 devastated the Florida Keys, splintering homes and crushing life from entire communities, the people cried to the experts. "This can't keep up! You must do something to protect us!"

The people had a right to be scared. A vivid account of the tragedy recalled by Lieutenant W. B. Scheibel, U. S. Coast Guard flier at Miami, justified their fright.

"The destruction and death spied from the air was appalling. Between Tavernier and Grassy Key, for thirty-five miles, only three houses stood. Except for a few battered mangroves, the coral rock was swept bare.

"At Upper Matecumbe a veterans' camp had stood. Now it was a shambles. A relief train, ready to bring five hundred soldiers from the Keys, was struck broadsides by tons of ocean driven in by winds around the hurricane's center. Tracks were twisted like tin. The locomotive lay on its side. Coaches were broken to bits or washed away. Victims lay everywhere, splattered among the wreckage, tangled in the mangroves, strewn along the tracks. Some were found miles away, blown into the Gulf. So stunned were the survivors, they didn't know for days what hit them.

"At Ismoralda, the railway station and post-office were demolished. Buttonwood Key was completely submerged, its inhabitants drowned, perhaps. At Deer Key, our seaplane picked up three men in a leaky boat, all that remained of a thriving colony. Cape Sable was swept of all habitation.

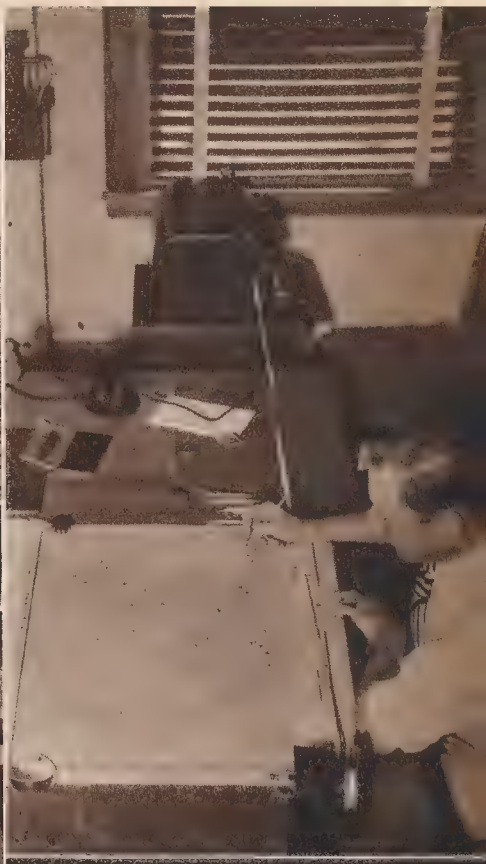
"At Matecumbe, the ship skimmed to a miraculously safe landing over eighteen inches of water. Wading ashore, the men found dead scattered everywhere. Sixteen survivors, all badly hurt, were carried to the plane. The take-off, even more risky than the descent, was made with the hull sliding along the mud bottom."

Experts heeding the cries of the public, met to plan ways to avoid disaster from future storms. It was a foregone conclusion that nothing could stop the winds. The files of the U. S. Patent Office in Washington were filled with impossible schemes; high walls to rebuff the gales; heavy guns to explode cyclonic air currents; nitroglycerin bombs to dynamite the powerful "eye" winds. Clearly the experts determined this was to be a defensive battle.

World-wide aid was enlisted. Appeals went out to specialists engaged in storm research in all parts of the earth. To Rev. E. Gherzi, Director of the Zikawei Observatory at Shanghai; to Rev. Charles E. Depperman of the weather bureau in the Philippines; to Richard W. Gray, meteorologist at San Juan, Puerto Rico; to I. R. Tannehill, Chief of the Marine Division, U. S. Weather Bureau, and to F. W. Reichelderfer, Chief Meteorologist, U. S. Weather Bureau. Government and private engineers were approached. Relief workers were invited to help. Scientific and aeronautical experts were urged to contribute from their vast source of knowledge and experience.

Investigators in the Florida Keys found that the demolished homes had been nothing but flimsy frame or stucco. Even a gale wind might have flattened them easily. They found no public building of safety for the people to escape a titanic blow. They noted that good radio reception from the Miami Weather Bureau was disturbed almost constantly by Latin interference from the South; that barometers hadn't been reset for years, and were far from accurate. The Keys themselves, investigators saw, were little more than strips of coral rock, smashed by the Atlantic on one side and by the Gulf of Mexico on the other. On these strips, storm victims had clung and died.

A view of the distribution of double layers of steel on the roof of the government's new "hurricane-proof" shelters in the Keys. Below: The finished storm fortress: solid, steel-inforced concrete.



Tracking down a storm in the office of the Miami Weather Bureau. Hundreds of reports feed in here daily during a hurricane. The teletype is part of the vast Teletype Hurricane Warning System of the U. S. Weather Bureau.

The aerial amplifier, designed by Coast Guard aeronautical engineers, broadcasts storm warnings while the plane is in flight. The pilot speaks through a tiny wrist microphone, and his words are roared out through the amplifier to warn people on the ground. Right: Hurricane warning flags, red with black, square centers, mean a storm on the way.

Within the past few years, the experts have stretched a Maginot line along the trembling lower East Florida shores. A long range hurricane warning system was introduced. Storm-proof shelters and wind resisting homes were built. Aerial microphones and amplifiers were fitted to planes to broadcast storm warnings. Direct radio, radiophone, cable and wireless communication between danger points and safety areas was made possible. Building specifications were strengthened and enforced. New meteorological instruments to spy on hurricanes were provided.

Up in the weather bureau at Miami, Ernest Carson, meteorologist, holds his finger on the pulse of the tropic seas where hurricanes are said to breed. His job is to supervise one of the vital lookouts of the new hurricane warning system whose far-flung outposts reach for thousands of miles in the uncertain waters of the Caribbean, the North and South Atlantic, and the Gulf of Mexico.

His legions of vigilant weather observers, armed with hypersensitive instruments, keep close watch over the lonely stretches of salt waste. Their watch-towers dot the blazing tropics from the Bahamas, Cuba, Haiti, Santo Domingo and Puerto Rico to the islands of the Lesser Antilles, and from Jamaica, Turks and Swan Islands in the distant Caribbean to the north coast of South America, French Guiana, the Canal Zone, Central America, Mexico and Bermuda.

A tropical disturbance can't get very far without being discovered. The G-men of this storm bureau of investigation get the first signs of gyrating air currents and flash them by cable or radio to Ernest Carson in Miami or to the meteorologists at Key West and Jacksonville.

Here they are teletyped to a dozen coastal cities, any one of which a hurricane is likely to strike. To Pensacola, Jacksonville and Key West, if the report is received in Miami; to New Orleans and Mobile; to Galveston, Port Arthur, Corpus Christi, Houston and Brownsville, Texas.

The meteorologist merely touches the keys of his electrical typewriter in Miami and its reception is instantaneous at all points on the teletype warning system.

As the disturbance develops, observers in or near the storm's path keep sending reports in, sometimes only twice daily, sometimes hourly, if necessary. As the hurricane nears the Florida straits, the Keys or the coast, advices literally swamp the weather bureau offices. As they feed in, they are charted on maps and teletyped around the circuit. Until the storm danger is past, this

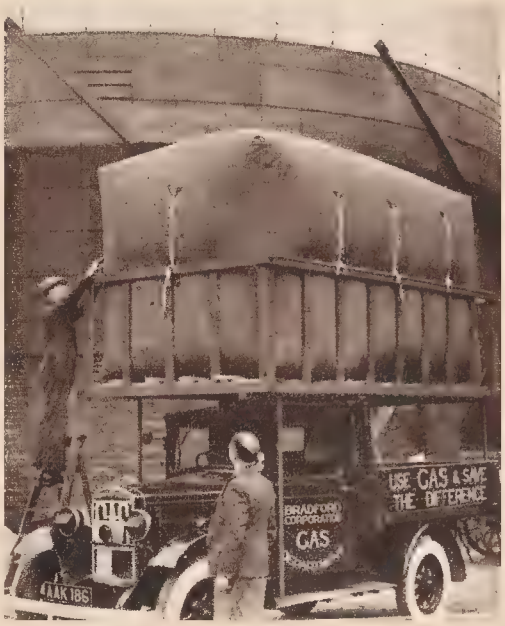
[*Continued on page* 123]

Old Age Assistance

LIKE a strong young fellow helping an old gentleman across the street is this powerful truck transporting the old Southern Pacific locomotive, *C. P. Huntington,* to Sacramento, Calif., for that city's centennial.

Speed With Economy

JULIUS ROSE, Glendale, Long Island, auto mechanic, spent four years building the flying wheel shown below. Rose claims the queer looking machine can travel 50 miles an hour and 250 miles on a gallon of gasoline.



Gasoline Autos On Way Out?

IN ENGLAND they are experimenting with coal gas as a motor vehicle fuel and claim it is as efficient as gasoline. The gas is carried on top of the vehicle in a large reservoir 12 feet by six feet by six feet, and with a capacity of 432 cubic feet. This amount of gas is equal to about two gallons of gasoline. The cost of operating a vehicle with coal gas is about the same as with gasoline. Coal gas filling stations have been opened.

Ghost Of The Highways

A MODEL of the famous Rolls Royce "Silver Ghost" of 1907 interested auto enthusiasts at the New York World's Fair.

New Life For Aching Feet

AN ELECTRIC medicated vapor bath is the latest device to bring back pep to tired feet. It chases fatigue by stimulating circulation.

Iron May Displace Concrete For Roads

TO CREATE an outlet for vast quantities of low grade iron ores generally unsuited for steel making, the University of Minnesota School of Mines Experiment Station has developed, after five years of research, a cast iron paving block. An experimental quarter mile of this pavement was recently laid on the highway leading into Eveleth, Minn. It is highly non-skid, easy on tires, and can be made and laid as economically as other paving materials when manufactured on a large scale.

Famous Fighter To Make Comeback

"DAMN the torpedoes, go ahead!" Admiral Farragut gave that stirring command from the bridge of the *U. S. S. Hartford* during the Battle of Mobile Bay, in 1864. The old 225-foot fighting sloop is being restored and will be placed, along with other renowned vessels, in a floating naval museum in Washington, D. C. The purpose of this museum is to demonstrate American naval development.

Time To Get Down

SO THAT student pilots who hire his planes will come back to earth when they should, Archie Baxter, of Floyd Bennett Field, N. Y., has invented a "flying time" alarm clock. Four control knobs enable the alarm to be set for 15, 30, 45 or 60 minutes.

What! No Trylon?

THE first of its kind is this spherodial water tank of 1,600,000-gallon capacity, built in Brookline, Mass., at a cost of $92,750. Welded throughout, the tank is 90 feet in diameter and 47 feet high. The advantage of its shape is that it can be screened from the surrounding residential district by trees.

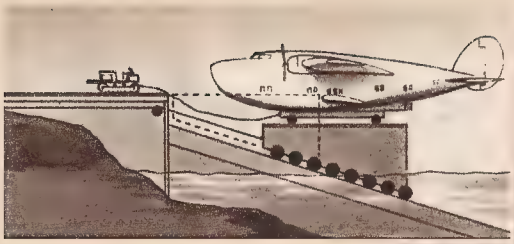
Shades Of The GAY NINETIES!

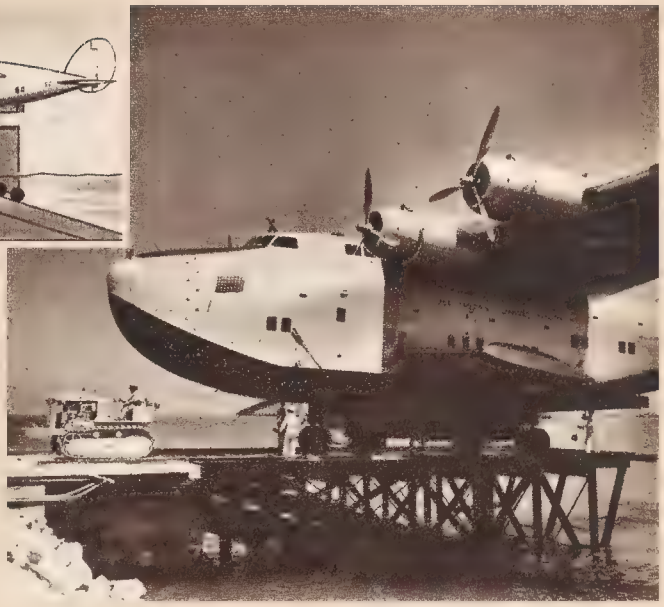
Above: A Model T Ford of 1912 vintage leads the parade of cars manufactured from 1911 to 1919. Left: A 1901 Oldsmobile has to be pushed when its aged engine goes dead. Bottom: Costumed contestants await starting signal in Knox made in 1900.

TWO thousand spectators came from far and near to watch 75 horseless buggies, belonging to members of the Veteran Motor Club of America, wheeze and chug their hesitant way around a race course at Framingham Center, Mass., during the entertaining events of an outdoor gymkhana held for the benefit of the Massachusetts General Hospital.

Reconditioned automobiles dating from 1896-1919 were assembled from all over the world to participate in this unique event, promoted by a group of hobbyists numbering eighty or more who recently banded together in the Veteran Motor Club for the purpose of collecting and repairing early vintage cars. As a result of their efforts in combing old barns and remote corners of the world an extraordinary collection of 300 antique autos now belong to different members of the club. In reclaiming the cars the original price is usually

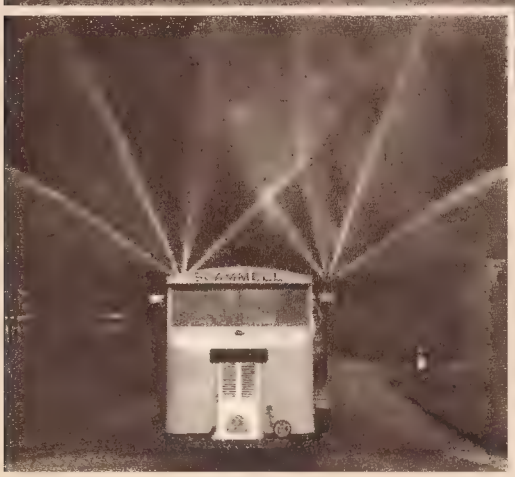
[*Continued on page* 126]





Giant Clipper Comes Ashore

GETTING the California Clipper out of San Francisco Bay and into its permanent hangar on Treasure Island is no easy job. First the marine railway comes up under the giant plane and carries it to the land level. Then a tractor hauls it away.



If It Could Only Cook!

A UNIQUE motor vehicle designed in England for wartime use performs three important jobs. It is an effective fire fighter, as shown above; it dispels poison gas, as at right, and it flushes and cleans streets by means of sprays which are located under its 1,250-gallon water tank. For dispelling gas, four fishtail sprays mounted on long pipes and equipped with universal joints throw into the air a solid, fan-shaped sheet of water seventy feet wide and thirty feet high.

Plastics For The Ladies

PRINCESS PLASTICS, in the person of Miss Dorothy McBride, of New York City, wears a hat made of cotton cellulose, jewelry fashioned out of coal, air and water, nylon stockings derived from coal, and she carries a coal-water-air plastic walking stick. She was presented at a distribution conference in Boston to show that, next to the auto industry, the American woman is the chief customer for plastics.

Kiddies Made War Conscious

WAR toys such as captive balloons, anti-aircraft guns, air raid shelters and army lorries will be popular gifts for English kiddies this Christmas.

For Calling All Cops

THE latest piece of standard equipment for Pittsburgh traffic officers is a portable radio receiver tuned in on the Pittsburgh police broadcast band. It is believed these sets will be very effective in cutting off the escape of criminals who are fleeing from the scene of a crime. Pittsburgh's Director of Police is shown above, instructing a patrolman on the operation of his new radio.

You're RIGHT—That's WRONG!

Here are 25 statements, some right, some very, very wrong. They all concern recent developments in the fields of science, commerce and industry. The trick, however, is to separate the *true* statements from the false ones—and that isn't as easy as it looks!

Can you do it? Go ahead, try, and when you're finished, give yourself a rating of 4 points for every one you answer correctly. It's loads of fun, and when you've tested your knowledge, you can work it on your friends. They'll enjoy it, and so will you.

Now, are you ready? Fine! Here they are:

1. Blind stenographers now take dictation in Braille.
   True ☐ False ☐
2. The new, hi-test safety glass used in 1940 automobile windshields will stretch like rubber and roll up like a rug when shattered.
   True ☐ False ☐
3. Long distance swimmers cover their bodies with grease in order to enable them to slide through the water easier.
   True ☐ False ☐
4. Knee-action is gradually being eliminated from most cars because engineers found that it tended to weaken the axles.
   True ☐ False ☐
5. A plastic, made from unroasted coffee beans, has recently been developed.
   True ☐ False ☐
6. The rubber ball is not so new, after all, Cortez found the Indians playing with rubber balls when he landed in Mexico.
   True ☐ False ☐
7. A new self-sealing tire tube will withstand punctures by objects the size of a ten-penny nail.
   True ☐ False ☐
8. Scientists contacted the moon recently and found it inhabited by descendants of Marco Polo.
   True ☐ False ☐
9. A new camera has been developed to simplify cake-baking contests by photographing the inside crumb and cell structure.
   True ☐ False ☐
10. Industrious Arabs of the Sahara have figured out a way to treat skis so that they may be used for desert travel.
    True ☐ False ☐
11. On the other hand, the Eskimos have discovered that camels are more efficient than dogs for pulling sleds in the Arctic.
    True ☐ False ☐
12. Some parts of Death Valley, California, are so hot that water, when it is found, contains no moisture.
    True ☐ False ☐
13. You can now buy an American passenger automobile which weighs less than a thousand pounds.
    True ☐ False ☐
14. You've heard of the little fishies that swam over the dam, but fish are carried over the Grand Coulee Dam, in Washington, in a truck.
    True ☐ False ☐
15. More than 300 products come from peanuts, including cheese, coffee, shaving lotions, linoleum and ink.
    True ☐ False ☐
16. Ice cream, in addition to making a fine sundae, is also an excellent refrigerant.
    True ☐ False ☐
17. New York, Chicago and other cities aren't the only places where an increase in traffic has been noted. The Panama Canal, for example, has just completed its busiest year in the last ten.
    True ☐ False ☐
18. Foreign automobiles are smaller than American makes because most of the countries that produce them are smaller than the United States.
    True ☐ False ☐
19. The current from an electric eel was used to throw the switch lighting up one of the buildings of the New York World's Fair.
    True ☐ False ☐
20. Speaking of the New York Fair, the oil well sunk on the Fair grounds at the petroleum exhibit produced all the oil needed by the exposition during its first year.
    True ☐ False ☐
21. Say what you will about the lowly tugboat, no great ocean liner ever has been able to land in New York without being aided by one.
    True ☐ False ☐
22. The French Palace at Versailles may be a wonderful thing, but to get water for it, a main had to be run from the Seine River, 14 miles away.
    True ☐ False ☐
23. The Empire State Building, in New York, won't have the distinction of being the world's tallest man made structure when the Palace of the Soviets, now under construction in Moscow, is completed.
    True ☐ False ☐
24. You can be reasonably sure that the "world's biggest ice-breaker" is not a device used by hockey teams. Actually, it is a ship which patrols the St. Lawrence River during the winter months.
    True ☐ False ☐
25. German submarines sank more Allied ships in the first month of the current war than in any similar period of the World War.
    True ☐ False ☐

WHAT'S YOUR SCORE?

To arrive at your score, simply give yourself 4 points for every question you answer correctly and total the result. If your mark is above 90, you are indeed exceptional; if it is between 80 and 90, you deserve high praise; if it's between 70 and 80, you're good; between 60 and 70 fair, and below 60—well, try again next month!

Answers will be found on page 121

Alarm Releases Rover's Rations

Right: "Wake up, lazy bones, and get me my breakfast. Can't you see I'm half starved?"

Below: "Gosh, I gotta do something about this. It's making a wreck of me. Hmm. Let's see."

Above: "An idea! A bit of wire looped around the alarm winder, so that at 6 a. m. it will push Mr. Pup's breakfast off the dresser." Left: "Ahhh! Sweet dreams once more!"

EVEN though his master had a job that kept him out each night until the wee hours, this Sealyham pup demanded his breakfast promptly at 6 a.m. His poor master was leading a dog's life until he hit upon a bright idea. He muffled the gong on his alarm clock and rigged a wire to the alarm winder, so that the clock would feed the dog at any time desired. Now all is serene during the early morning hours.

Caddy Car Carries Languid Linksman

AFTER 20 years of golfing, Lyman Beecher was tired of walking around the fairways, so he set to work to figure out a way to make such an expenditure of energy unnecessary. The result was the caddy-drawn conveyance shown at left, which has a special rack in the rear for carrying clubs. Beecher's golfing companions assert that his game has shown considerable improvement lately.

Ferry Rides Ocean Waves

BUILT for the placid rivers on which she has been operating for eleven years, the ferryboat *Cubango* is making a 6,000-mile voyage from Norfolk, Va., to Rio de Janeiro, where she will be used for ferry work on the bay. Captain Walter Tingey and a crew of ten are aboard her for the journey, the longest ever attempted by a boat of this type. She is boarded up fore and aft with heavy timbers to prevent the wash of waves over her deck.

Sweet—But Not Sticky

THERE'S no longer any need to worry about sticky fingers when squeezing a lemon at the table. With the lemon tongs shown at right, the pretty lady can squeeze the fruit without it touching her fingers.

Uncle Sam's soldier birds were real heroes in the World War—but they couldn't fly at night! They've been taking lessons since then, and today finds us with a feathered fleet that is the finest in the whole world!

Pigeons about to alight on the U. S. Army's mobile loft, at the Army Signal Corps School, Ft. Monmouth.

A light elastic harness holds a capsule large enough to carry maps and photographs on the pigeon's back. Below: Pigeon training lofts at Fort Monmouth, N. J.

Turning Pigeons

AFRAID of the dark? Not *these* pigeons! Even though it is against every instinct of a pigeon to fly at night, the U. S. Army finally has developed a bird that will fly any time—and anywhere! Regardless of rain, fog or the inky blackness of midnight, the new feathered fliers of the Signal Corps will stick on the job better than any soldier in Uncle

How night fliers are trained. More experienced birds are released under warlike conditions created by clouds of gas, fireworks, and explosions.

All photos by U. S. ARMY SIGNAL CORPS.

Into Owls

by James Nevin Miller

When the army war birds go to the front, they are carried in baskets like this one, which is carried on the back of a soldier, known as a "pigeoneer."

Sam's ranks. In a word, the most spectacular soldier-bird of all times has been developed, a homing, night-flying pigeon with the instincts of an owl and the eyes of a bat. To these most amazing birds, the murk and confusion of a battlefield at midnight are more natural than the blue sky and sunshine of the fairest day.

Trained from infancy on a diet of darkness, the Signal Corps' newest fledglings know no meaning for the word night. They operate on a 24-hour shift, and their successful development is a triumph for the Signal Corps over obstacles which man has been trying to surmount for years.

Before they are five weeks old, these feathered flyers are convinced that their age-old refusal to function after dark will not be tolerated. The cream of the pigeon crop is selected at this tender age and placed immediately into darkened lofts. Then, every night they are let out for regular exercises, beginning just before dusk, on the first night, and continuing each evening from then on—regardless of weather conditions—until the

Pigeoneers returning the birds to the basket after a flight. Note the way they hold the pigeons. Right: A 10-week old pigeon with leg band attached.

birds are thoroughly familiar with living, feeding and exercising in almost total darkness. At regular intervals, the more experienced fledglings are released under distinctly war-like conditions, created artificially by setting off fireworks, miniature explosions and clouds of semi-poisonous gas.

Under such rigorous training, is it too much to suppose that America's next war will produce winged heroes whose exploits may even dim the achievements of "President Wilson," Uncle Sam's most valiant flyer of the World War? For the next conflict will witness these pigeons turned into owls, who will perform at their best when the chips are down, when all other means of communication have failed, and when the protective cover of night shields them for most spectacular duty.

And surpassing the accomplishments of "President Wilson" will be a task for any bird! It was the "President," you may recall, who—despite a leg carried away by a shell—continued to carry his precious messages from the Verdun front to his loft at Cuisy; and in the St. Mihiel operations, he was one of the most heroic figures in action. After his hero's death at Fort Monmouth, June 8, 1929, "President Wilson" was mounted, and is now on exhibition at the Smithsonian, in Washington.

Another American-bred flyer of the World War days, whose feats of valor will have to be outclassed by the new night-owls if they wish to achieve fame, was the stalwart pigeon, Cher Ami. Liberated during intense machine gun and artillery fire on the afternoon of October 21, 1918, and carrying a message of vital importance to the Allied cause, Cher Ami successfully negotiated the 40, fire-

Upper picture shows one of the U. S. Army's night-flying messengers being removed from his basket. Above is *Cher Ami*, feathered hero of the World War.

Below: The birds are trained to carry the aluminum leg capsule shown here. This is the capsule normally used for carrying messages from the front lines.

Below: Another hero of the World War was "President Wilson," who carried messages from the front at Verdun despite absence of a leg, shot off by enemy fire.

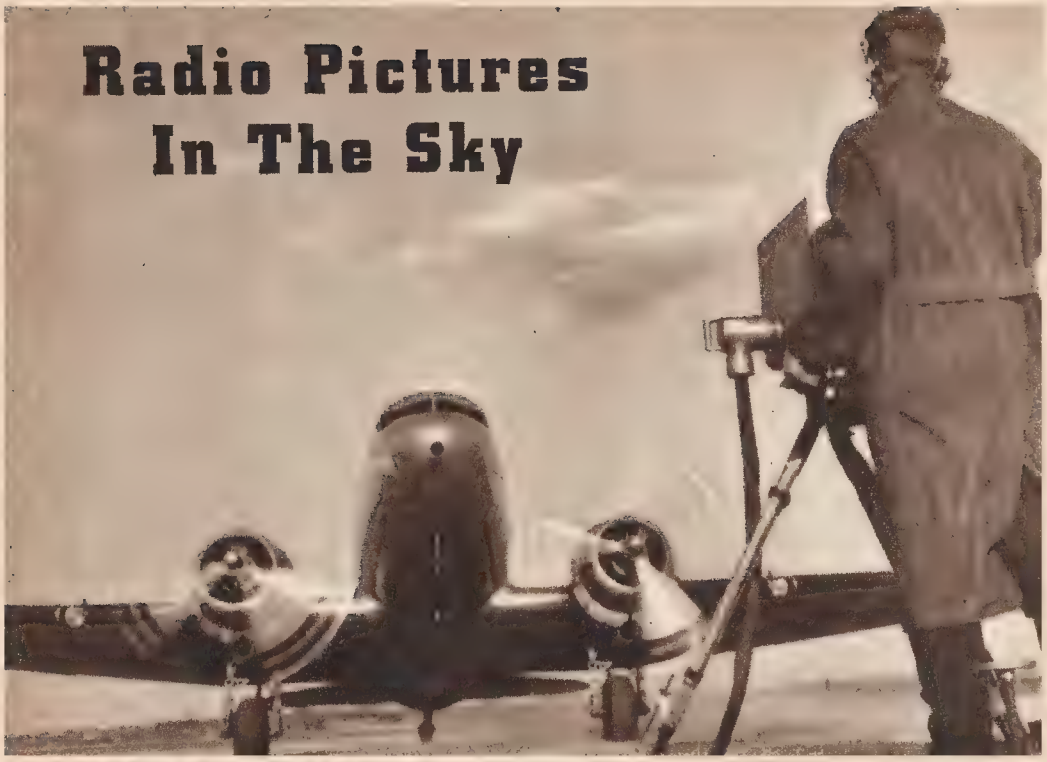
strafed kilometres to his loft at Ramport in the remarkable time of 25 minutes. Upon examination after this gruelling flight, it was found that one of Cher Ami's legs was missing and his breast had been pierced by a machine gun bullet!

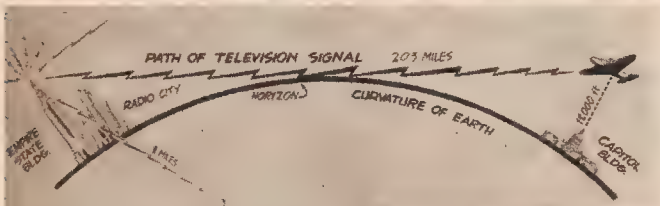
The message had gone through, however—in fact, was found hanging by a ligament to the torn leg—and Cher Ami lived to tell his fellow flyers of his valiant flying "above and beyond the call of duty." When he died, shortly after his return to this country, Cher Ami was mounted for display in the National Museum in Washington.

It is the belief of the Signal Corps, however, that their night flyers *will* surpass these astonishing deeds, as well as the war records of the 3,000 other birds sent abroad for American use in the first World War. Not only is the latest Signal Corps product completely at home in all kinds of atmospheric conditions, he is said to be faster than any other pigeon ever developed, and what's more,

[*Continued on page* 127]

Radio Pictures In The Sky



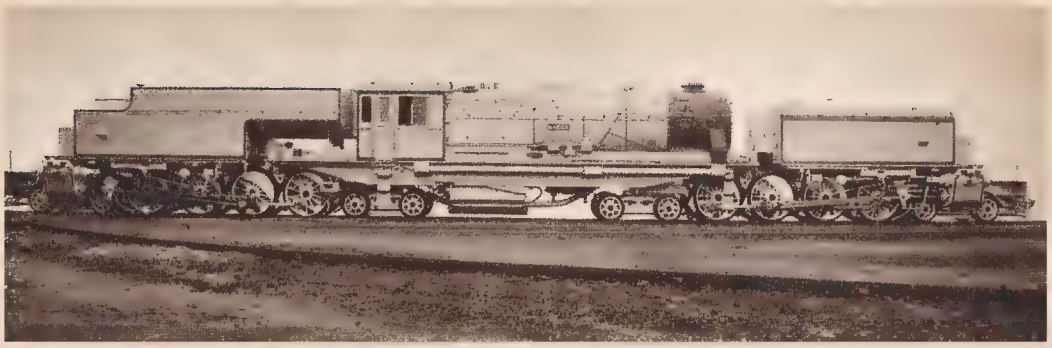


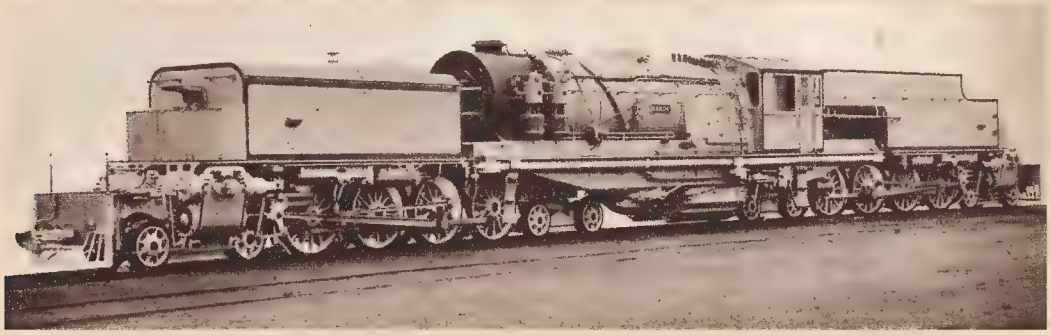
Above: As the plane swept up the runway for its landing, it was televised by the mobile pick-up unit. The latter relayed the signals to the television transmitter on the Empire State Building. The receiver in the plane (below) picked up the radio impulses and reproduced the plane's own image! Diagram at left shows path of signals when plane was over Washington and "saw" television images there.

PASSENGERS in a giant airliner, temporarily equipped with a television receiver, recently had the novel experience of seeing themselves land at New York's Municipal Airport at North Beach, Queens. As the plane taxied up to its hangar, it faced a mobile television truck of the National Broadcasting Company, and the receiver reproduced the images transmitted by the portable pick-up unit via the actual radio transmitter on the Empire State Building.

The plane had previously flown to Washington, D. C., where, at an altitude of 21,600 feet, engineers aboard it were successful in seeing an NBC studio program, 203 miles distant. The whole trip was arranged as a stunt to

[*Continued on page* 126]



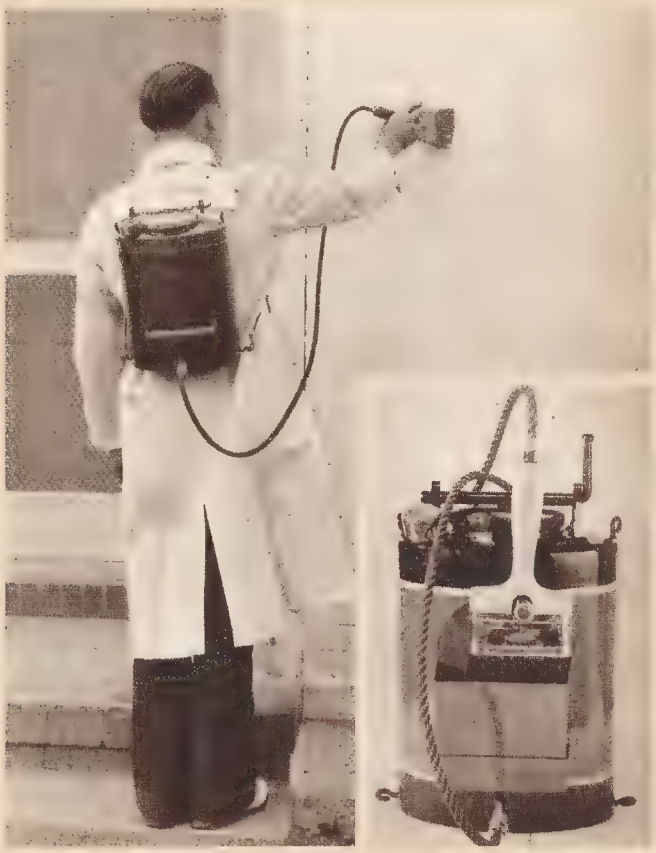


Snake Has Nothing On This Engine

THIS giant of the rails, the world's largest narrow gauge steam locomotive, was built for use in Africa on the difficult run between Nairobi and Kampala. One hundred feet long, the engine is built in three sections to enable it to snake around sharp curves in the winding track, which ascends to 9,000 feet at one point. The middle part rests on pivots on front and rear sections. The giant's great length is to give it standard gauge pulling power on the light rails of the narrow track.

Takes Backache Out Of Painting

YOU don't need to stoop and dip the brush when painting with this knapsack unit. Paint is fed by air pressure and there are no fumes. Work is speeded up 50 per cent.



Will This Be Our

by Hi Sibley

A glimpse of the highway of tomorrow, showing the futuristic cars speeding along at close to 100 m. p. h.

WILL chemical science revolutionize automobile design in the next generation?

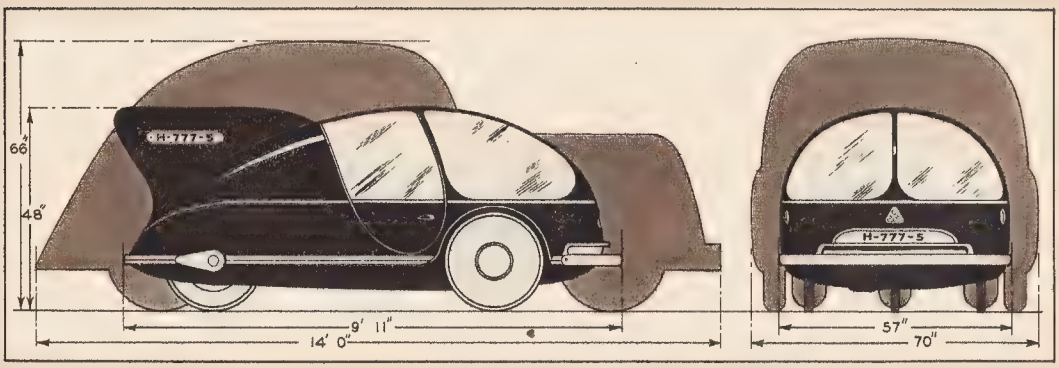
It is entirely within reason to predict that the car of the future will weigh one-fourth as much as the average current automobile, travel twice as fast with complete safety, run as silently as a breeze and sell for less than one hundred dollars. It may be driven by an entirely new power—the controlled expansion of liquified gases in a pressure engine, without ignition, fumes or noise and vibration due to reciprocating parts.

Here are the drawings of a car along these lines. Power is derived from two complemental gases, which we shall designate as X and Y. These have been liquified under tremendous pressure which renders them inert until they are mingled together in liquid form. At that instant they begin to vaporize with attendant expansion, but *do so gradually enough to be controlled and applied to useful work.*

Such a gas could be used in a simple pressure engine, such as a rotary engine devoid of reciprocating parts. It would run as smoothly as an electric motor. This type of engine would be simplicity itself.

Development of plastics makes possible the forming of the automobile body in two halves, something like a walnut shell except that the lower half would be more shallow. Such a plastic, known as Duramold, has already been developed and is now manufactured by a secret process. It has been proved ten times as strong as stainless steel, weight for weight, and is now used in quantity production in airplane fuselages.

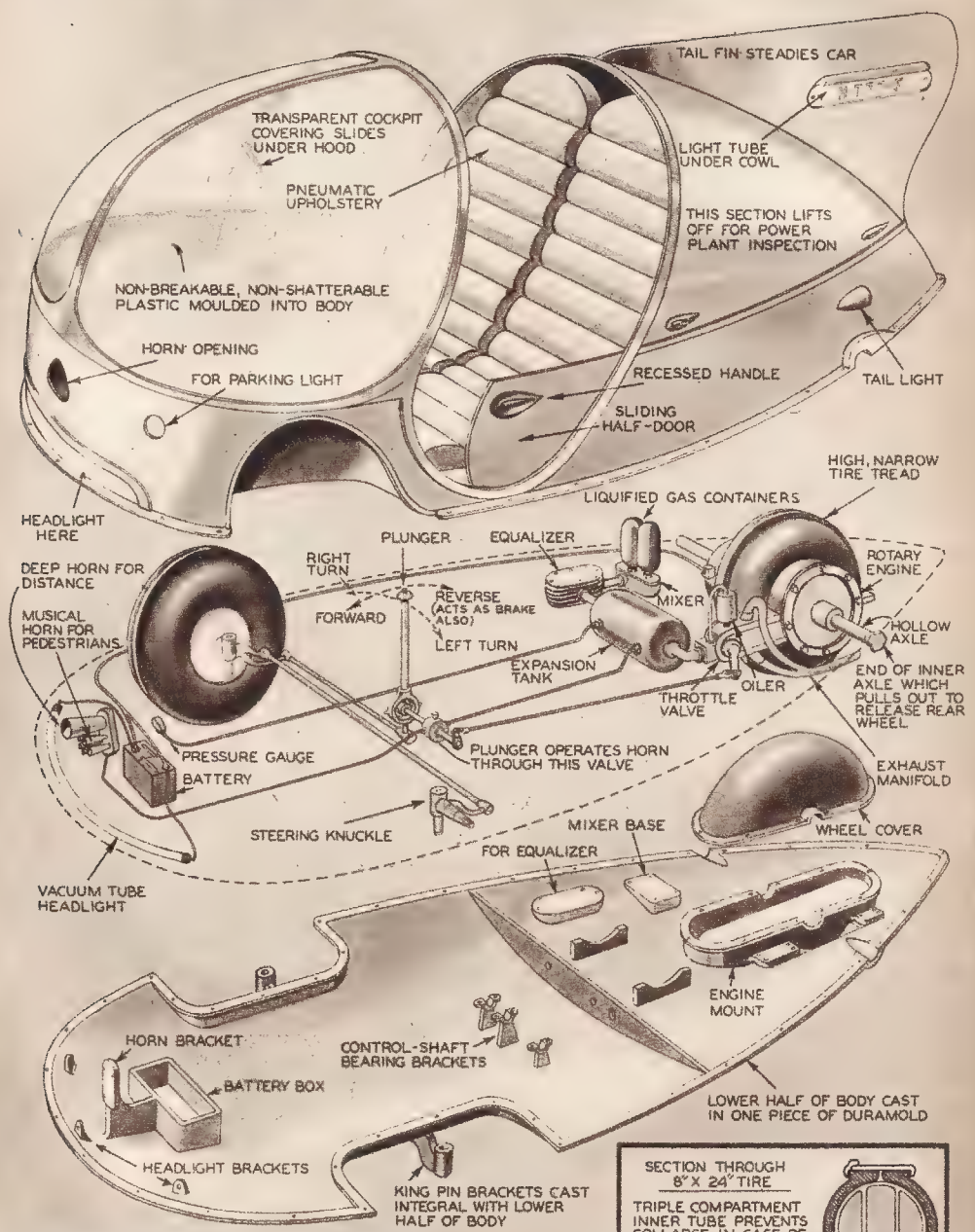
In the plastic chassis the front axle is integral with the lower half of the body, as well as housings for rear axle bearings, brackets for various fixtures, etc. There are no springs, but super-size tires at low pressure absorb all shocks in this light car. To avoid road suction of these large tire surfaces, each



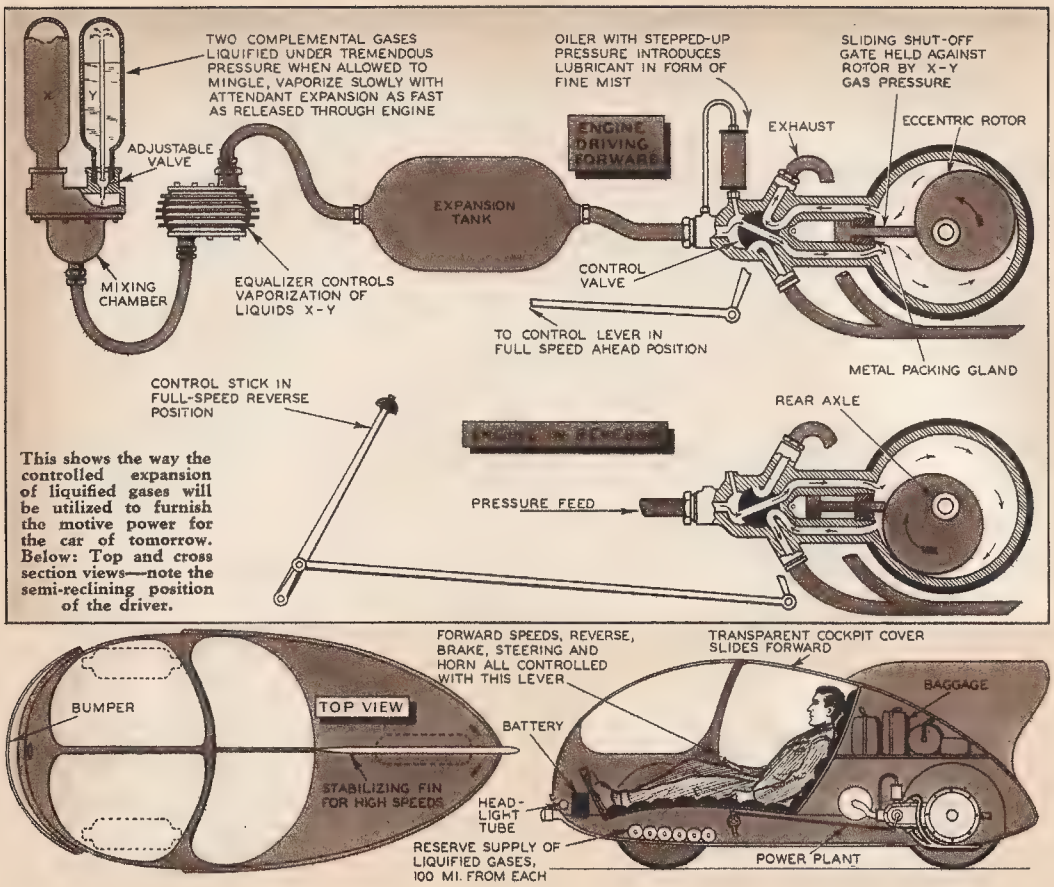
This diagram shows how the car predicted for 1960 will compare with the average car of today in size. A much shorter wheelbase and the single rear wheel will make for far greater maneuverability—parking will be a pleasure in 1960!

1960 Model Car?

A gearless "teardrop" of plastic is the prediction for tomorrow's automobile.



These drawings show the comparatively simple construction of the plastic, pressure-driven car of 1960.


TWO COMPLEMENTAL GASES LIQUIFIED UNDER TREMENDOUS PRESSURE WHEN ALLOWED TO MINGLE, VAPORIZE SLOWLY WITH ATTENDANT EXPANSION AS FAST AS RELEASED THROUGH ENGINE
OILER WITH STEPPED-UP PRESSURE INTRODUCES LUBRICANT IN FORM OF FINE MIST
SLIDING SHUT-OFF GATE HELD AGAINST ROTOR BY X-Y GAS PRESSURE
ENGINE DRIVING FORWARD
EXHAUST
ECCENTRIC ROTOR
ADJUSTABLE VALVE
EXPANSION TANK
MIXING CHAMBER
EQUALIZER CONTROLS VAPORIZATION OF LIQUIDS X-Y
CONTROL VALVE
TO CONTROL LEVER IN FULL SPEED AHEAD POSITION
METAL PACKING GLAND
CONTROL STICK IN FULL-SPEED REVERSE POSITION
REAR AXLE
PRESSURE FEED
FORWARD SPEEDS, REVERSE, BRAKE, STEERING AND HORN ALL CONTROLLED WITH THIS LEVER
TRANSPARENT COCKPIT COVER SLIDES FORWARD
BAGGAGE
BUMPER
TOP VIEW
BATTERY
STABILIZING FIN FOR HIGH SPEEDS
HEAD-LIGHT TUBE
RESERVE SUPPLY OF LIQUIFIED GASES, 100 MI. FROM EACH
POWER PLANT

This shows the way the controlled expansion of liquified gases will be utilized to furnish the motive power for the car of tomorrow. Below: Top and cross section views—note the semi-reclining position of the driver.

has a tough, narrow tread moulded on.

Three wheels not only give a perfect three-point contact with the road, but do away with the need of a differential and flexible running gear. The single drive-wheel is driven by the engine motor on the axle itself, as is the electric generator. The latter serves solely as a battery charger for the lights. There are no gears in the entire car. Nor are there any brakes; simply reversing the engine brings the light vehicle to a velvety stop. Generator and engine rotor are mounted on a hollow axle. Within this is a solid axle which can be withdrawn to drop out the rear wheel for changing the tire. This, however, would be necessary only when the tire was practically worn out, since the inner tube is rendered practically puncture proof with its three air compartments.

Lighting is by vacuum tube, providing a far-reaching, soft, anti-glare and fog-piercing light through a long slot at the front of the body. Warning signals consist of air horns, a large, deep-toned one for distance and fog; a group of smaller ones with a pleasant musical whistle for pedestrians and close-at-hand traffic. Transparent plastics are moulded into the body, giving wide visibility through non-breakable material. The driver handles the car from a semi-reclining position on pneumatic upholstery, completely relaxed, with the entire control of the car at the airplane type "stick" at his right hand. Moved sideways the lever steers the car, forward it admits pressure to the engine, backward it reverses the engine and serves as brake. In steering a special equalizing arrangement keeps the car under control at all speeds, and the fin on the back of the body stabilizes it at high speeds.

The liquified gases which serve as the source of power will be prepared by hydro-electric power so readily available, and retailed through service stations in non-corrosive steel bottles. They will be dispensed in pairs, empty containers being turned in for the filled ones. A pair of these cylinders would drive the little car 100 miles, and reserve bottles would be carried under the seat.

Synchro-Flash For Cable Release Shutter

by L. B. Robbins

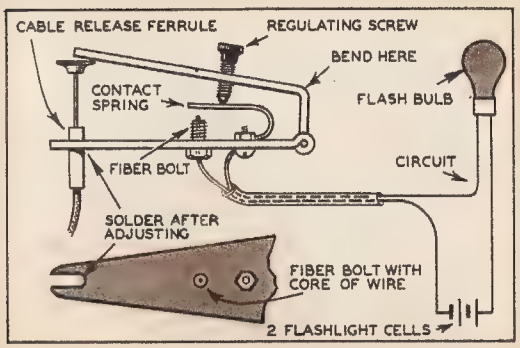
YOU can make this efficient synchro-flash release very easily and cheaply. It fits any cable release shutter. The diagram shows how it is done. A brass hinge and two or three radio fittings comprise the material needed.

Bend up one leg of a heavy brass strap hinge, so that the top leg slants at an upward angle when at rest against the finger push of the cable release.

Saw a slot in the end of the bottom leg. The ferrule of the cable release fits into this slot. The ferrule is later soldered in place after proper adjustment. Drill two holes near the hinge end. Tap one for a radio fiber or hard rubber bolt. (The body of an old tip jack is good.) Into the other hole insert a short machine screw. It holds in place the spring brass which completes the circuit.

Drill the fiber bolt through the center lengthwise, insert a short piece of stiff brass wire to same as a contact point. Drill and tap a hole in the top leg of hinge and insert a radio binding post screw with rubber head. This contacts the brass spring below.

Now adjust the cable release ferrule in the slot. The thumb button must rest securely against the upper leg. Now set camera shutter on "bulb," and press down the hinged top. As the spring contacts the brass wire protruding from the fiber plug, the circuit is completed and the shutter opens.



Details of the synchro-flash construction are given above. Note that the cable release ferrule should be soldered.

Above: The synchronous flash release shown ready for use. It can be hand held—off to the side—away from the lens.

Details of the flash synchronizer are shown in the above photo. Note simplicity of parts used; their cost is minor.

Modern Photographic Mount

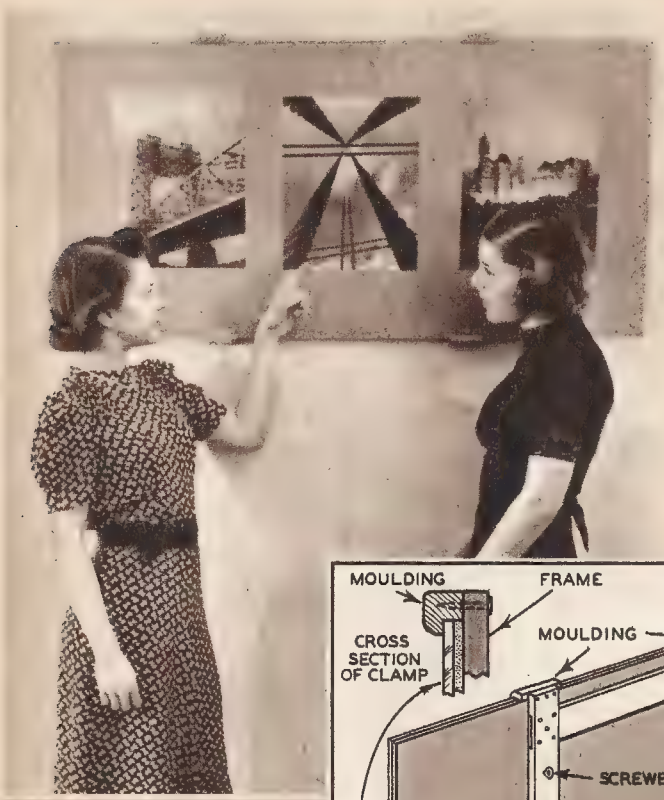
AN EASY-TO-MAKE, modernistic bracket to hold a glass photograph mount may be constructed from picture moulding and light strips of wood, including the glass, for less than a dollar.

Two feet of special moulding, shaped as shown in detail diagram, can be obtained at any picture frame store or lumber yard for a few cents. The moulding, cut in four-inch lengths, is screwed to the top and bottom of the wooden strips (or wire nails can be used). It is a simple matter to slide this skeleton frame over the glass and cardboard mount, provided the framework has been made to the exact size of the glass. The frame is thus *behind* the mount.

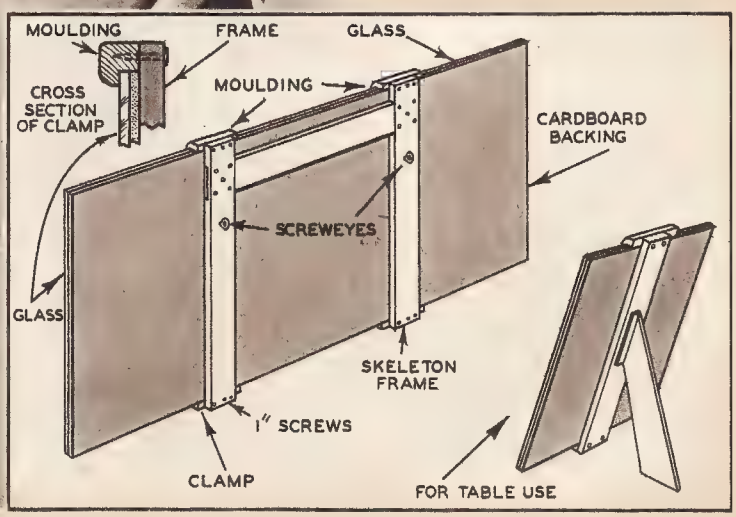
Double-weight window glass, beveled on the edges, can be obtained inexpensively from a glazier. The mount shown in the photo is four feet by two feet, a convenient size because either cardboard or sheet cork for the backing is standard in this size. Three 11 by 14 photographs can be mounted between the glass and the backing. (Plate glass unnecessary.)

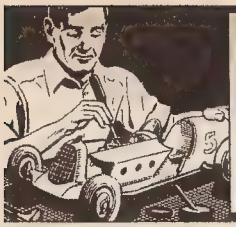
The skeleton frame clamps the glass firmly, and two screw-eyes on the back cross-brace are used to attach to the wall. Or, a wooden support can be attached as in diagram of small-sized frame, and the glass mount stood on a table. Varnish stain or bright enamel should be applied to the moulding, the only part of the "bracket" that is visible.

This manner of construction also affords you an opportunity to make an extensive photographic display panel for a long wall, as a hallway. The size of the mount can simply be increased by doubling it or adding sections.



The above photographic mount can be made with as many sections as desired. Single sections for table use are made as indicated in the drawings at right. Dimensions are not given for the simple reason that the size of the mount depends on the picture size.





How to Build SECTION

Table Top Croquet. Great fun for winter evenings. Can be played by two or four persons. Page 104.

PICK YOUR PROJECT

Illustrated on this page are some of the things you can build from the plans and instructions given in this section. Select the one or ones that appeal to you, turn to page indicated.

Modern Table Of Functional Design. Graceful hoops form the legs of this simple but sturdy table. Can be built with only a saw, drill and screwdriver. Page 93.

Colonial Utility Stand In Natural Maple. Beautiful and useful piece of *good* furniture of easy construction. Turn to page 108 for plans and instructions.

Maple Dowel Toys. Many comic animals are possible with these dowels. Page 102.

Dinner Gong Lion. Sculp him from jigsawed blanks. Page 104.

A miniature country village lends enchantment to the tree

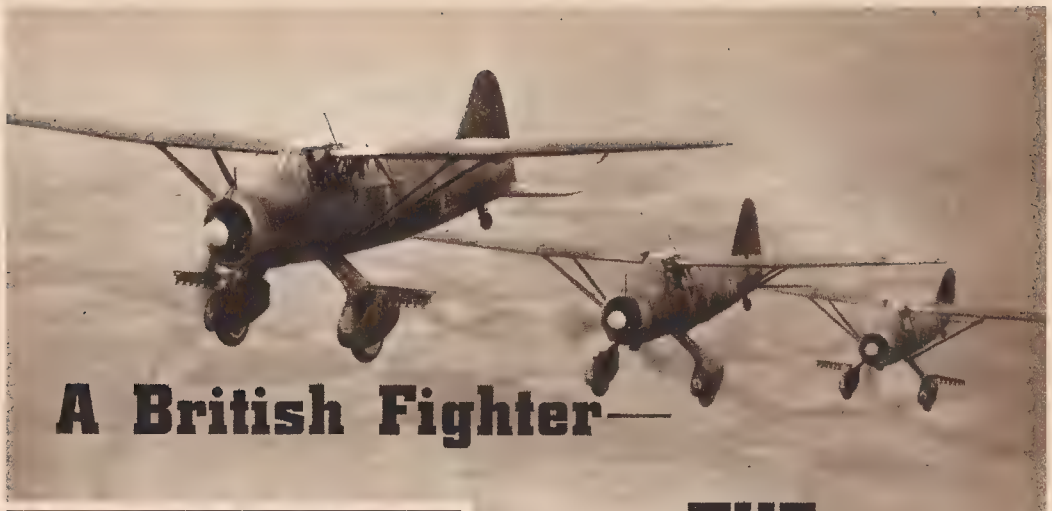
TOY VILLAGE For The TREE

ERECT a toy village under the Christmas tree this year and see what it does for increased family interest. It is a feature in which every member can share from Junior to dad.

"Toy village" is a loose term that embraces such items as a church, a manger crèche, a street corner, a village, or a whole countryside. The countryside in turn may include not only farms and buildings, but even zoos and jungles. Here is a heap of room for both imagination and skill. [*Continued on page* 130]

Most of the materials come from the five-and-ten. Street lamps are brass tubes set in electric wall plug bases.

Snow scene may also be used with charming effect. The pickets in the fence are ordinary meat skewers.



A British Fighter—

THE WESTLAND "LYSANDER"

At top are seen three real *Lysanders*, with model in lower left inset. The comparison speaks for itself.

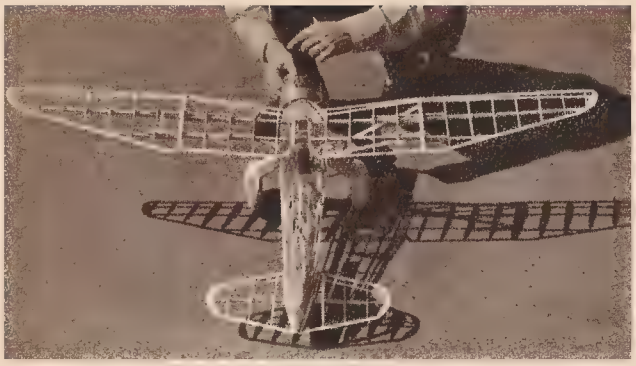
by Roland Cueva

Build a 50-in. gas powered scale model of the British warplane that has recently been doing valuable work over Germany's Westwall.

PERHAPS the most widely used and dependable ship among all those Britain's air forces is Westland Aircraft's *Lysander,* a two-seat Army Co-operation monoplane. *Lysanders* constitute a major offense—defense unit of the R.A.F. and are scattered throughout the British colonies and protectorates, from Egypt to India.

Designed for a variety of purposes, this all-around versatile fighter is heavily armed, carrying three machine guns and two bomb racks. It is equally at home on observation flights, bombing or ground-strafing raids, or attacking enemy planes—in fact, any phase of aerial warfare. A Bristol "Perseus" 905 H.P. engine gives a top speed in the neighborhood of 250 miles per hour, and a ceiling close to 30,000 feet. Despite the tremendous wing loading of 23 pounds per square foot—equivalent to high speed single seat pursuit ships—the *Lysander* has a high safety factor and slow landing speed (50 m.p.h.) because both slots and flaps are incorporated into the wings. Unusual visibility is obtained by the low window line and divided wings, which allow a clear view of the entire sky above, through the glass roofed cockpits. The most remarkable

The graceful semi-gull wing design is displayed in the photo above. Note headlights in wheel pants.



Framework is very sturdy and built to take the bumps all flying models occasionally get. Rudder is movable but stabilizers are fixed.

Outer wing sections remove for transportation. If crash occurs they will shear off.

Detachable motor mount. Wood pieces projecting from bulkhead are temporary, later to be replaced by wire cowl supports.

Camouflage color job is the finishing touch. You can follow this design or originate your own.

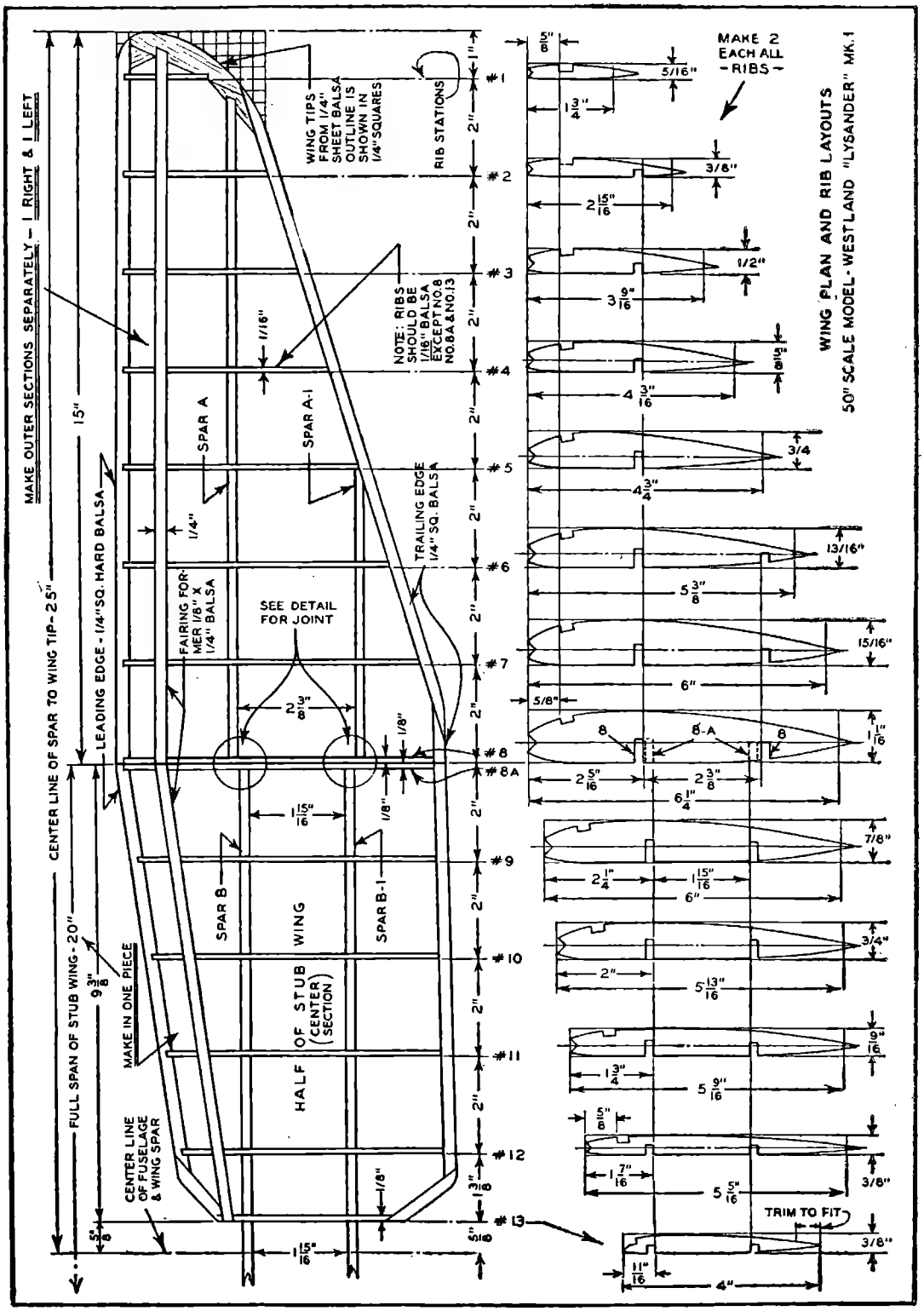
Stripped down for flying. Hinged cowl, wheel fairings and cockpit hatch can be seen on the ground.

feature of this remarkable plane is the streamlined fairing enclosing each wheel. Each "pant" contains a machine gun, headlight, and is fitted to carry a detachable bomb-rack which juts out from the fairing like a small wing. The machine guns fire straight ahead outside the propeller disc, making synchronizers unnecessary, and are fed from the cockpit through ammunition chutes in the undercarriage fairing.

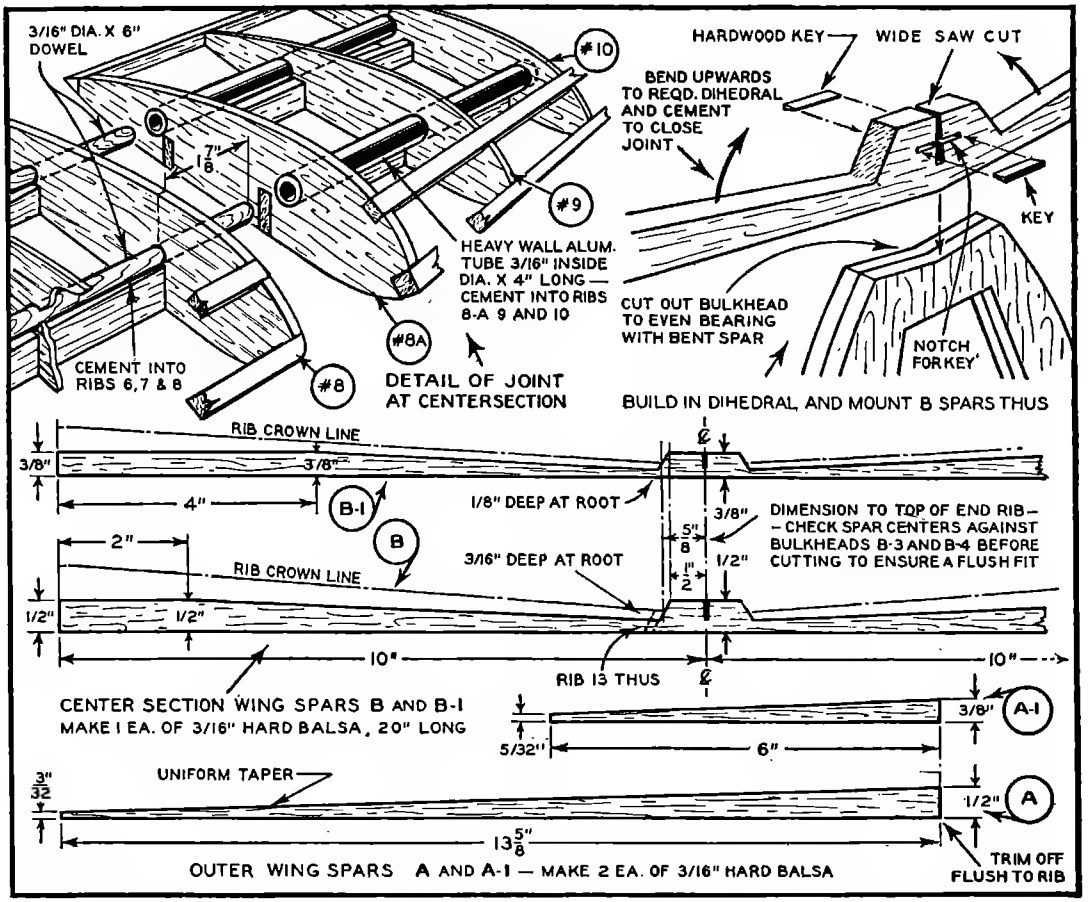
Now that you know all about the original *Lysander*, you can start building this interesting gas-powered scale model. Naturally, a few deviations had to be made in designing this model so that it would fly well, but the lines, proportions, and details of its prototype have been adhered to as faithfully as possible, and a glance at the photos will affirm this, even down to the camouflaged paint job.

Since the model obviously could not employ wing slots, the wing area had to be slightly increased to offset the high loading per square foot of the big plane. This also applied to the stabilizer surfaces. This increased area is not enough to be noticeable. In all other respects, save for added dihedral in the wings for stability, the model is in true scale, 1 inch to the foot. The *Lysander* has a span of 50 feet, which made the model 50-in., exactly right for an Ohlsson 23, Hi-Speed Torpedo, or other 1/7 horsepower engine. Wheel "pants," wing struts and motor cowl are removable, and should be taken off for flying. Outer half of each wing is also detachable, for convenience in transportation.

Start construction by laying out contours of wing and tail ribs, backbone and fuselage formers full size. This can be done either by copying in pencil or having the printed drawings photostated up to exact size. In any case, great care must be taken to get



Cut all balsa parts a trifle over the line and sand down even for perfect results. Apply cement liberally to all joints and allow ample time for drying.

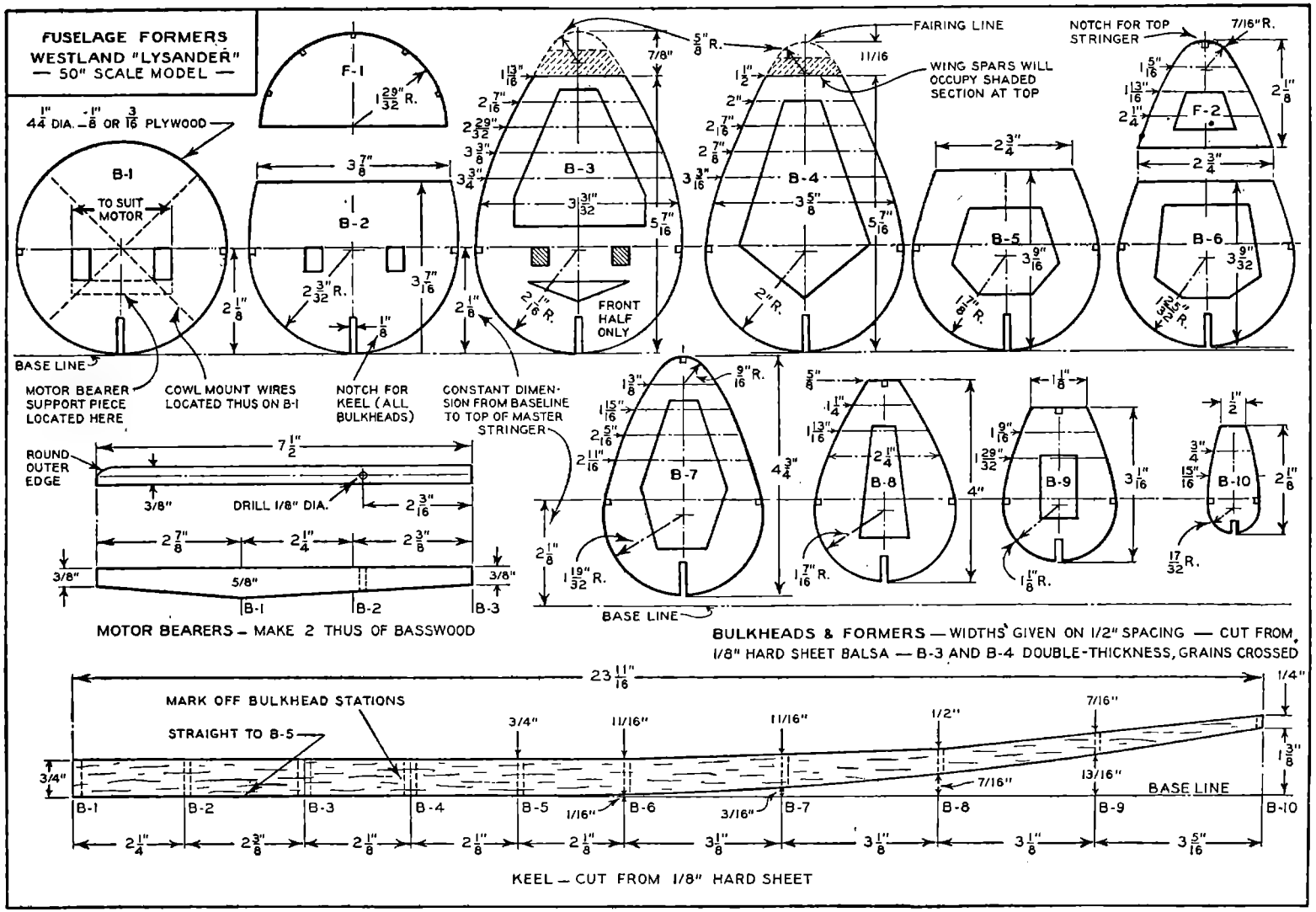

3/16" DIA. X 6" DOWEL
#10
#9
#8A
#8
CEMENT INTO RIBS 6,7 & 8
HEAVY WALL ALUM. TUBE 3/16" INSIDE DIA. X 4" LONG — CEMENT INTO RIBS 8-A 9 AND 10
DETAIL OF JOINT AT CENTERSECTION
HARDWOOD KEY
WIDE SAW CUT
BEND UPWARDS TO REQD. DIHEDRAL AND CEMENT TO CLOSE JOINT
KEY
CUT OUT BULKHEAD TO EVEN BEARING WITH BENT SPAR
NOTCH FOR KEY
BUILD IN DIHEDRAL, AND MOUNT B SPARS THUS
RIB CROWN LINE
3/8"
4"
B-1
1/8" DEEP AT ROOT
DIMENSION TO TOP OF END RIB — CHECK SPAR CENTERS AGAINST BULKHEADS B-3 AND B-4 BEFORE CUTTING TO ENSURE A FLUSH FIT
2"
B
3/16" DEEP AT ROOT
1/2"
10"
RIB IS THUS
CENTER SECTION WING SPARS B AND B-1 MAKE 1 EA. OF 3/16" HARD BALSA, 20" LONG
A-1
5/32"
6"
UNIFORM TAPER
A
OUTER WING SPARS A AND A-1 — MAKE 2 EA. OF 3/16" HARD BALSA
TRIM OFF FLUSH TO RIB

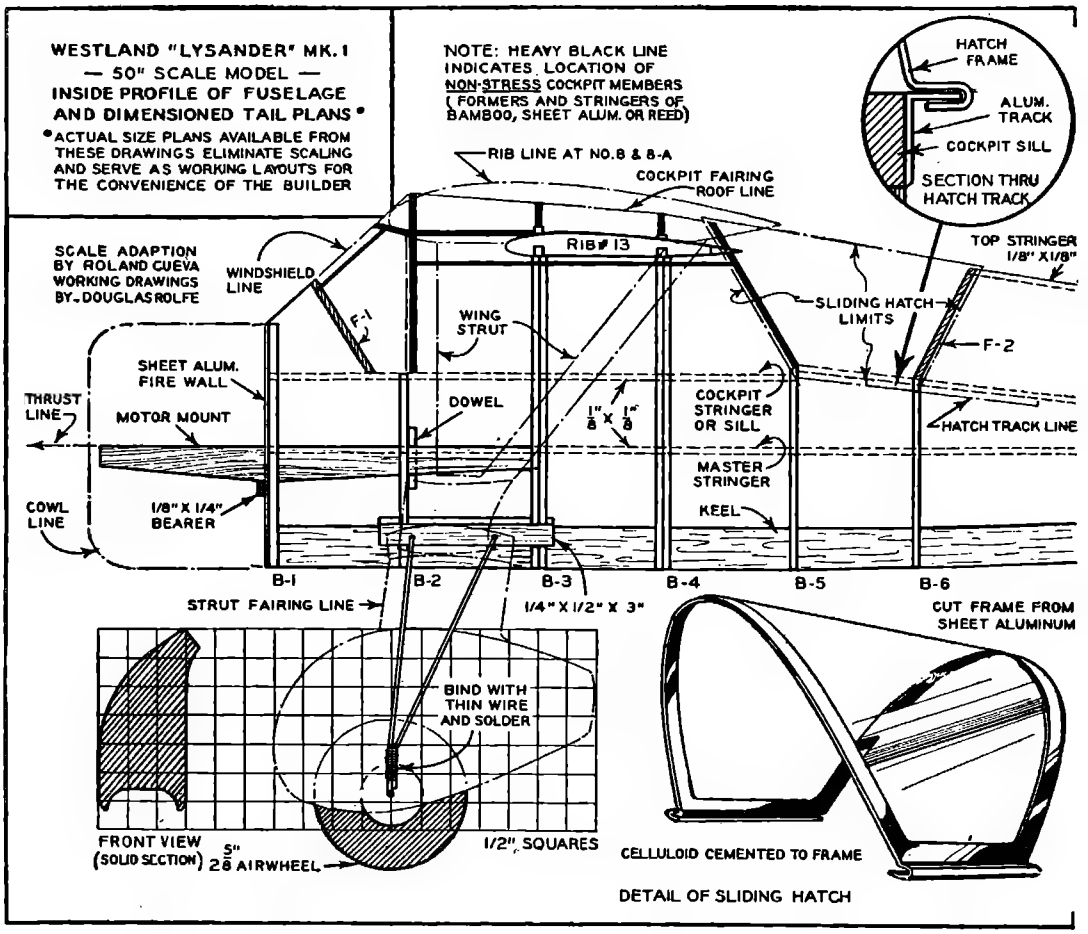
Bomb racks were not included because they are really extra equipment and hardly necessary in a model. However, should the reader so desire, he can easily shape them from soft balsa and glue to wheel fairings, using the photo on page 81 as a guide.

these drawings correct, as the accuracy of your finished model depends on it.

The wing is made first, so trace the rib drawings into $\frac{1}{16}$-in. sheet balsa, with the exception of the two center ribs on each side where the wings separate, and the ribs adjoining the fuselage, which are ⅛-in. thick. Cut them out with a sharp razor and notch each one as indicated in the drawings. Now the tapering spars may be cut to size and shape from ½x½-in. balsa. The center wing section is made in one piece, later to be cut at the middle and rejoined for correct dihedral. Lay a sheet of waxed paper on your building board and pin the spars down in their proper positions. Mark lightly in pencil each rib station, and proceed to fit the ribs over the spars, applying cement liberally. If your ribs have been notched properly, each one will automatically take its proper position, giving true contour to the wing. When the ribs have become firmly set, leading and trailing edges may be applied. These are ¼-in. square balsa, and are trimmed and sanded to final shape after the cement has hardened. If, at any point along the front of the wing a slight gap occurs between leading edge and rib, do not worry about it. This simply means that the front notches were not cut exactly true, and you can cement splinters in the gaps to make them tight. However, careful cutting in the first place will obviate patching later on. Follow the same procedure for the outer wing sections.

After the entire wing is complete, insert and secure the aluminum sleeves in the center section, as shown. These sleeves receive dowels set in the outer sections, and by this means the wings can be taken apart for carrying. Dowels must be a snug but not a driving fit. The spars may now be cut at the exact center and rejoined with the correct amount of dihedral. Do not cut them all the way through but saw them from the top down about three-fourths of their thickness. Use a saw with a fairly thick blade. Drop cement


FUSELAGE FORMERS
WESTLAND "LYSANDER"
— 50" SCALE MODEL —
1/4" DIA. - 1/8" OR 3/16" PLYWOOD
F-1
B-1
TO SUIT MOTOR
B-2
B-3
B-4
B-5
B-6
F-2
FAIRING LINE
WING SPARS WILL OCCUPY SHADED SECTION AT TOP
NOTCH FOR TOP STRINGER
FRONT HALF ONLY
BASE LINE
MOTOR BEARER SUPPORT PIECE LOCATED HERE
COWL MOUNT WIRES LOCATED THUS ON B-1
NOTCH FOR KEEL (ALL BULKHEADS)
CONSTANT DIMENSION FROM BASELINE TO TOP OF MASTER STRINGER
ROUND OUTER EDGE
DRILL 1/8" DIA.
MOTOR BEARERS — MAKE 2 THUS OF BASSWOOD
B-7
B-8
B-9
B-10
BULKHEADS & FORMERS — WIDTHS GIVEN ON 1/2" SPACING — CUT FROM 1/8" HARD SHEET BALSA — B-3 AND B-4 DOUBLE-THICKNESS, GRAINS CROSSED
MARK OFF BULKHEAD STATIONS
STRAIGHT TO B-5
KEEL — CUT FROM 1/8" HARD SHEET



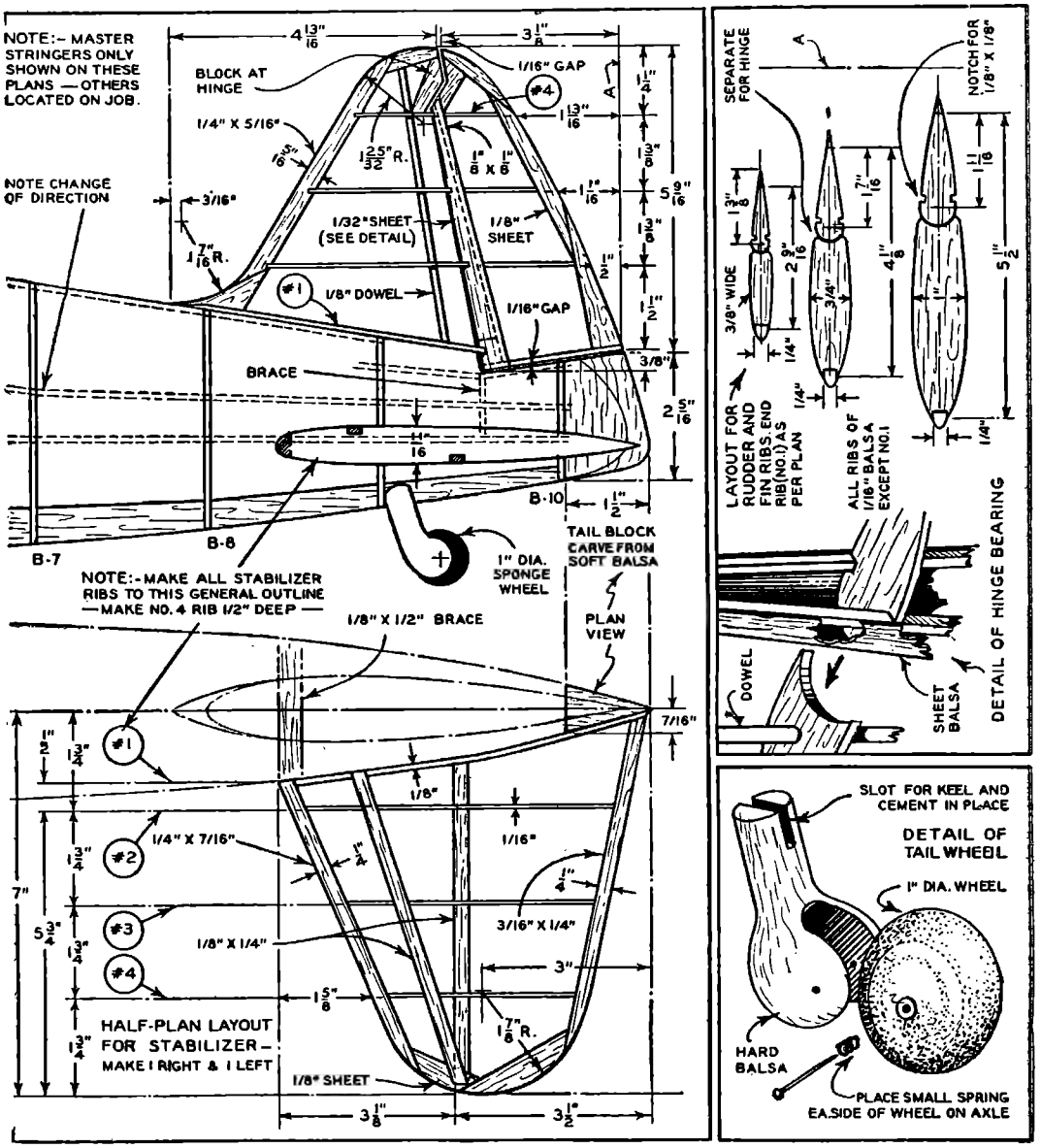
The celluloid cabin windows are all cemented to the framework with the exception of the top, which fits into grooved strips made from sheet aluminum and is removable.

in the cracks thus formed and force the outer ends of the wing up until the crack squeezes tightly together and keep this way until set. Then notches are cut with a razor blade at right angles to the saw cut, and a small piece of hardwood cemented into each notch. The resulting joint will never pull apart and will give the wings their dihedral. An arbitrary dihedral is indicated on the plans but may be varied simply by widening or narrowing the saw cut.

The stabilizers and rudder come next, and the same general procedure used in constructing the wing may be followed here also. Movable rudder is made in two pieces, the rear section pivoting within the front, and held in place by strong thread or wire. The central upright around which the thread "hinges" are wrapped is of hardwood. All tail surfaces are laid aside when complete to be joined later to the fuselage (see plans).

Fuselage formers or bulkheads are all of ⅛-in. sheet balsa, and the two which support the wing are double, that is, two ⅛-in. pieces cemented together with the grains running opposite. The engine bulkhead may be ⅛-in. plywood, or as in the original model, ⅛-in. and $\frac{1}{16}$-in. sheet balsa cemented together, with a firewall of sheet aluminum outside of that. The latter arrangement is slightly lighter and gives better fire protection.

It is a good idea at this time to cut the holes for the hardwood motor bearers in the engine bulkhead and the next two behind it. In bulkhead No. 3, the holes are not cut clear through, but only halfway. This is so that the ends of the bearers may have a firm seat. Width apart of the holes depends upon your motor. Another plan is cut the bearers to the measurements given, mount the motor on them, *then* cut the holes after fuselage framework is complete. The latter method is probably the more accurate, but the reader may take his choice. Motor mounts are held

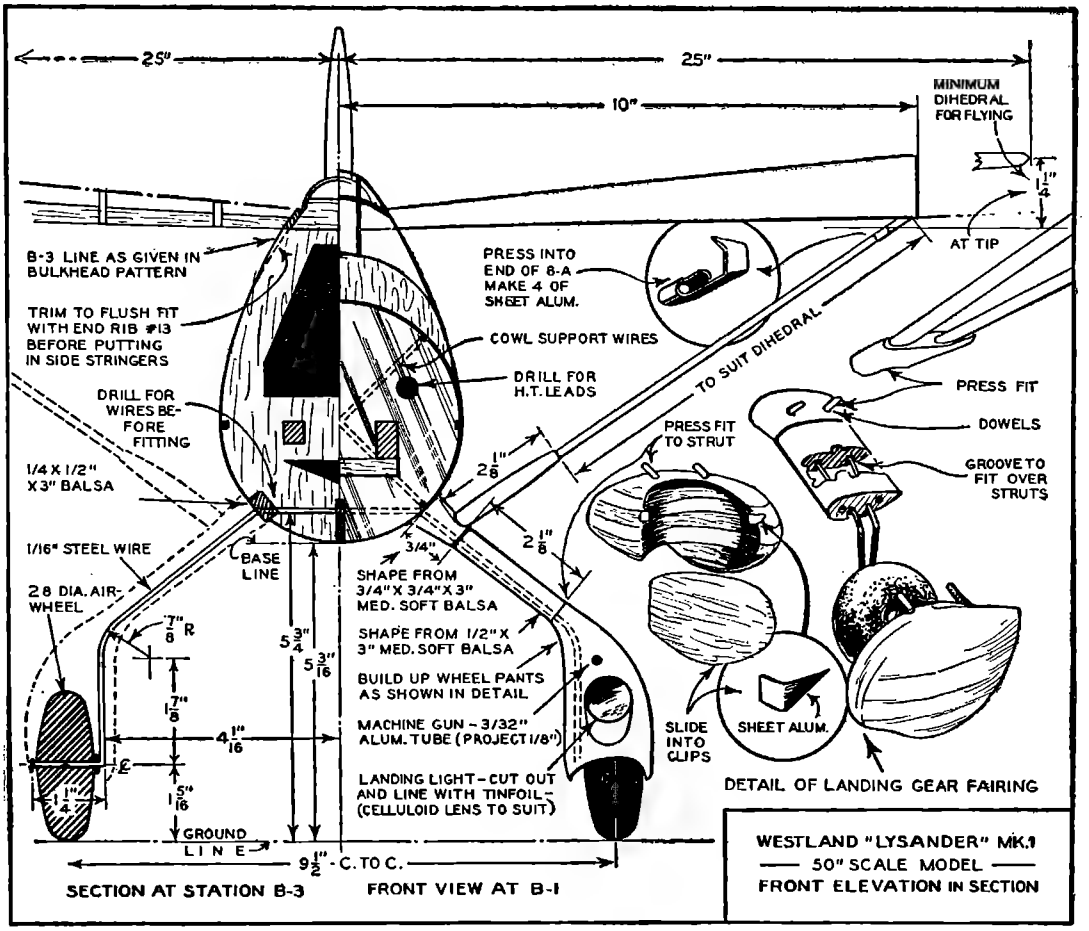


in place by tight-fitting dowels pushed into holes drilled vertically through them just behind No. 2 bulkhead. The motor with mounts can thus be removed in a few seconds by simply pulling out the dowels.

Notch all the formers exactly in the center of the bottoms, and cement them to the keel or backbone, at their proper stations. The notches *must* be deep enough so that the bottoms of the formers are flush with the bottom of the keel—this automatically gives the correct shape to the entire fuselage.

Be sure that every former is set up plumb and square to the keel. The whole assembly can be held to the building boards with pins while hardening. Incidentally, the fifth former from the nose is made in two sections, joined at the angle shown. Add the upper part after the lower has become integrated with the keel. Now you are ready for the stringers. The master stringers of ⅛-in. square hard balsa are located exactly halfway up the side of the (at the engine bulkhead) fuselage. Notches are cut in the formers and solid balsa tail block to receive them, and they are then cemented in place, held with pins until solid.

Next come the cabin sills, also of ⅛-in. square hard balsa. These can be located from the drawings, and are followed by the stringer


25"
25"
10"
MINIMUM DIHEDRAL FOR FLYING
1¼"
AT TIP
B-3 LINE AS GIVEN IN BULKHEAD PATTERN
TRIM TO FLUSH FIT WITH END RIB #13 BEFORE PUTTING IN SIDE STRINGERS
DRILL FOR WIRES BE-FORE FITTING
1/4 X 1/2" X 3" BALSA
1/16" STEEL WIRE
2 8 DIA. AIR-WHEEL
BASE LINE
7/8" R
5 3/4"
5 3/16"
1 7/8"
4 1/16"
1 1/4"
1 5/16"
GROUND LINE
9 1/2" - C. TO C.
SECTION AT STATION B-3
FRONT VIEW AT B-1
PRESS INTO END OF 8-A MAKE 4 OF SHEET ALUM.
COWL SUPPORT WIRES
DRILL FOR H.T. LEADS
2 1/8"
2 1/8"
3/4"
SHAPE FROM 3/4" X 3/4" X 3" MED. SOFT BALSA
SHAPE FROM 1/2" X 3" MED. SOFT BALSA
BUILD UP WHEEL PANTS AS SHOWN IN DETAIL
MACHINE GUN - 3/32" ALUM. TUBE (PROJECT 1/8")
LANDING LIGHT - CUT OUT AND LINE WITH TINFOIL - (CELLULOID LENS TO SUIT)
TO SUIT DIHEDRAL
PRESS FIT
DOWELS
PRESS FIT TO STRUT
GROOVE TO FIT OVER STRUTS
SLIDE INTO CLIPS
SHEET ALUM.
DETAIL OF LANDING GEAR FAIRING
WESTLAND "LYSANDER" MK.1
50" SCALE MODEL
FRONT ELEVATION IN SECTION

The 4½-in. spun aluminum cowl can be bought at a model supply store. Cut it in half, hinge with strip aluminum with a catch on the opposite side, and make a hole in the top to accommodate cylinder of your engine.

running from the top of the angled former back to where the rudder will be attached. The latter is also ⅛-in. square. The other stringers (two underneath on each side running whole length from engine bulkhead to tail block and three above on each side aft the angled former) are of ⅛ x $\frac{1}{16}$-in. balsa, though you may make them all ⅛-in. square for added strength if you wish. The original model is extremely strong, however, and has the eighth by sixteenth stringers. These intermediate stringers should be spaced evenly, and can be located by pinning them along the formers and marking their paths with a soft pencil. They are then removed and the notches cut, after which they are cemented finally in place. Although this method takes a little longer than if every longeron were pre-indicated, it makes for a better shaped fuselage and cuts down the margin of possible error and consequent waste.

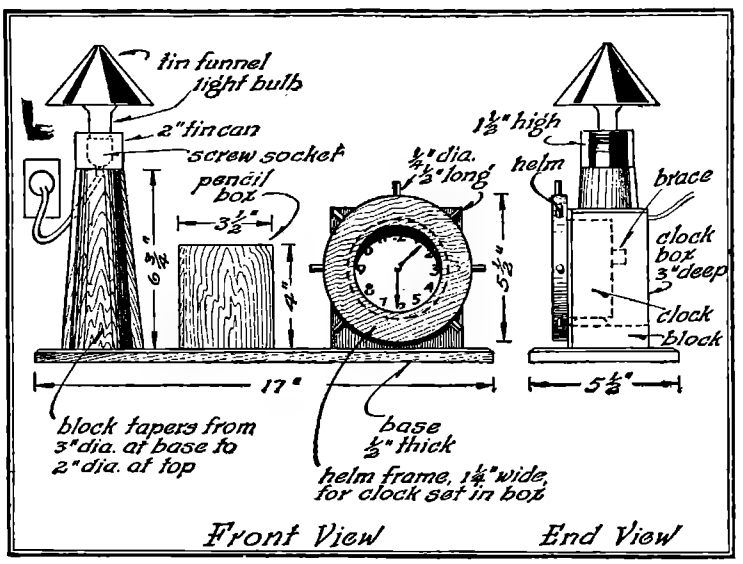
Landing gear and tail wheel are next on the list. Carve the housing from the latter out of hardwood or balsa and slot the top to fit over the keel. The 1-in. sponge rubber wheel is slung on an axle of $\frac{1}{16}$-in. spring wire run through the housing. This axle doesn't turn, so it may be cemented in and the holes on the outside covered with filler or plastic wood. A tiny spring on each side of the wheel centers it in the housing. Springs must naturally be inserted when assembly of wheel, axle and housing takes place. Cement the tail wheel unit to the keel, snugly up against the last former.

The skeleton of the landing gear is bent from $\frac{1}{16}$-in. diameter steel spring wire to the shapes shown. You will note that the double wire of the landing legs is wound with copper wire and soldered where it unites just above the wheels. Before doing this, the blocks which hold the assembly in the fuselage must be cut, drilled and slid on the wires—it can-

[*Continued on page* 132]

"Jolly Roger" Desk Set

YOU can make this desk set from a light cord and socket, a small clock, a tin funnel and some pine boards taken from a packing box. The wood pieces can be planed down to the sizes shown, or cut out with a small saw and finished with your knife. The base, when finished, has a bevel around the upper edge, which can be whittled. It measures 5½ inches wide, about ½ inch thick, and 17 inches long. The light-house is a block of wood, and is whittled out of a block 3 inches square at the end and 6¾ inches long. When finished and rounded, the block should be about 3 inches thick at the lower end and 2 inches thick at the top. Find a tin can, open at the top, which is about 1½ inches high and 2 inches across the bottom. Punch a hole ½ inch across, in the center of the bottom and tack the can to the top of the block. Bore a hole ¼ inch wide in the center of the light-house block at the top, and then bore another hole leading from the side of the block to the center hole. The hole opening in the side should be about 2 inches below the top.



Unscrew the short screws in the light plug, which hold the two wires, and pass the wire or light cord through the hole in the top of the block, screwing the bottom of the screw socket into the top of the block. Bend the wires around the screws in the plug and screw them down tightly with a screw driver, so that they will be just as you found them. Fasten a light bulb in the socket. Get a tin funnel, about 4 inches across, and place it on a board. With another board or hammer, strike the spout straight downward, and it will be forced from the funnel cone. If the spout is tightly soldered, it will be necessary to cut off the spout with tin snips or old shears.

The pencil box consists of four boards, each ¼ inch thick, 3¼ inches wide and 4 inches long, nailed together as shown so that the edge of one board overlaps the one next to it at each corner. Drive small nails through the underside of the base into the lower ends of the box, so that the pencil box is centered on the base, midway between light-house and clock helm. The helm frame and box for the clock is made to fit a round clock not over 4¼ inches in diameter. Nail three boards together, each board being one-fourth inch thick, 3 inches wide and 5 inches long, to form a three-sided frame or box for the clock. Cut out a board one-eighth inch thick to fit the front of the box, and nail it in place. Saw out a helm frame, 5½ inches across and ½ inch thick. The round opening cut out in the center should be just large enough to expose the face of the clock you are to use. Nail the round helm frame to the front of the box, marking around the inside edge of the opening upon the thin board covering the box. Then cut out the round opening in the box front, whittling and sandpapering the edges.

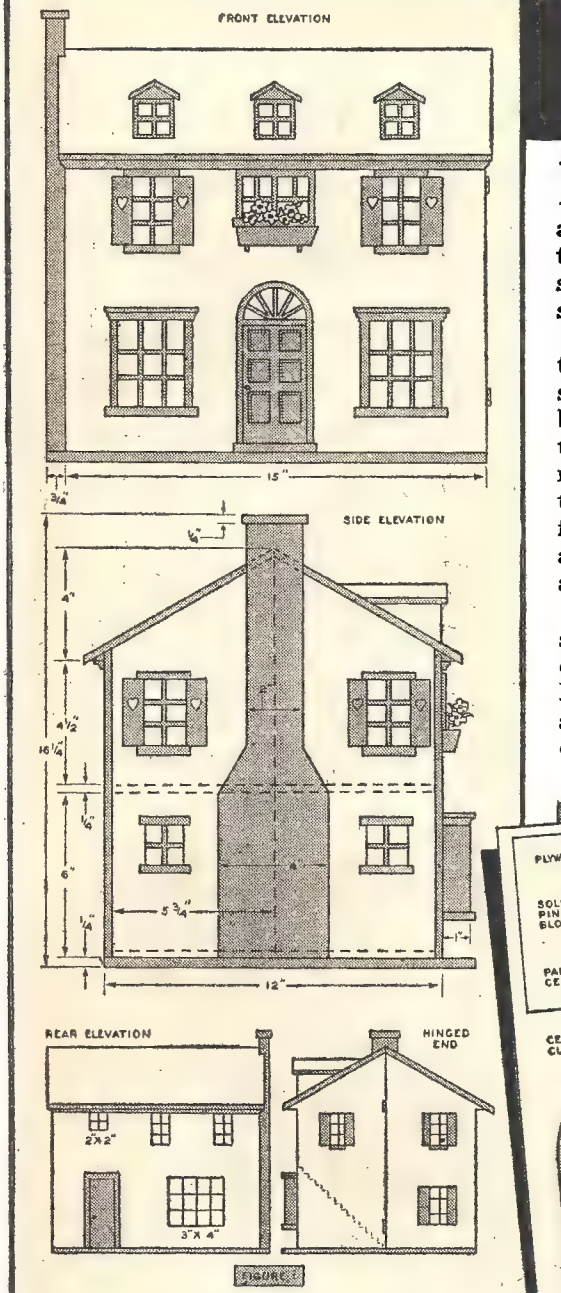
Place a wood block inside the box, so that the clock is raised high enough to expose the clock face at the front of the helm. Whittle out seven helm spokes, nailing them to the edge of the helm frame in the positions shown. A stick is cut to fit across the inside of the box, against the back of the clock to hold it in place. Nail through the sides of the clock box into the ends of the brace stick. Enamel the funnel and tin can brown, and stain the wood parts a walnut brown, finishing with varnish.—*E. V. H.*

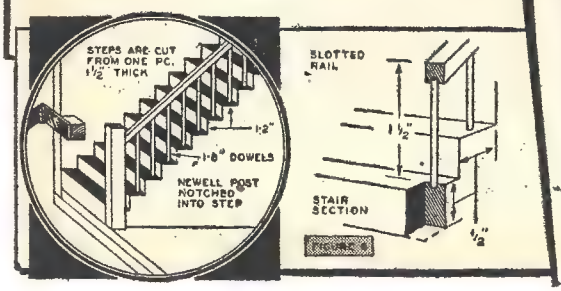
SWING-OPEN

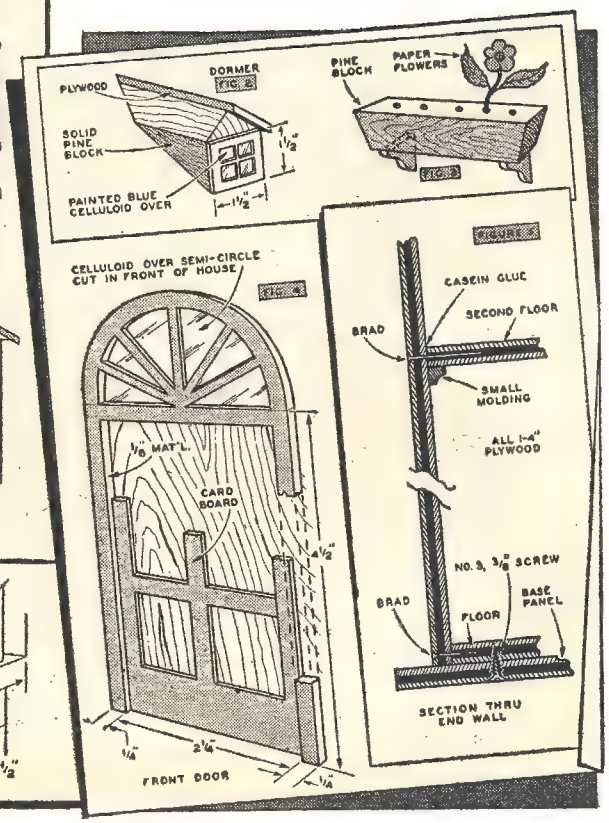
HINGED on one end, this novel doll house opens out like a suit-case to give full access to all the rooms. When closed, it has the appearance of a conventional job. Construction throughout is of ¼-in. plywood assembled with brads and casein glue.

General dimensions, floor plans and location of windows are given in Fig. 1. Note that sashes are installed in all window openings, but these may be dispensed with if you prefer to simplify the work. Front and rear doors are not cut through, but merely outlined with the framing. The front door, however, has a fan-light cut out at the top, and panel effect achieved by glueing on a pasteboard veneer, as illustrated.

A view of the house partially opened is shown in Fig. 10, and this gives a clear idea of how it is constructed. Because of the overhanging eaves at the end, the hinge pins should be set out from the wall perhaps $\frac{3}{16}$-in. or so, something on the order of an automo-







DOLL HOUSE

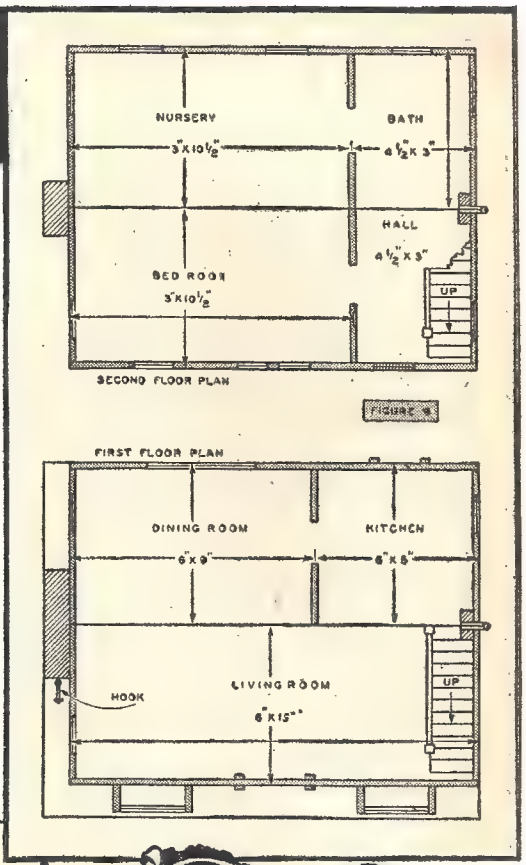
bile door. Use substantial brass hinges, with blocks glued on the inside of the wall, as indicated. Arrangement of floors is shown in Fig. 5. The second floor should rest on a molding strip glued to the wall.

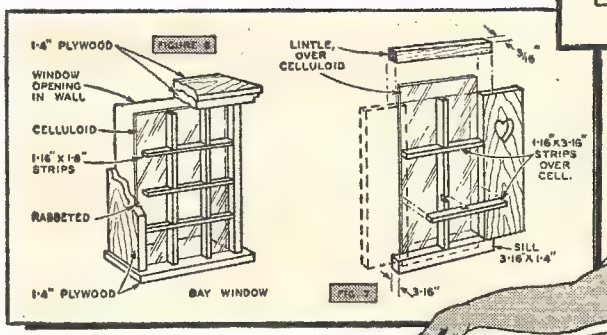
The staircase may be a simple set of steps cut from a solid block, or built up of smaller pieces glued together, Fig. 8. A railing is not hard to make, as shown here. The spindles may be dowels or ⅛-in. square sticks, glued into a slotted rail. The lower ends are set in holes drilled in the treads.

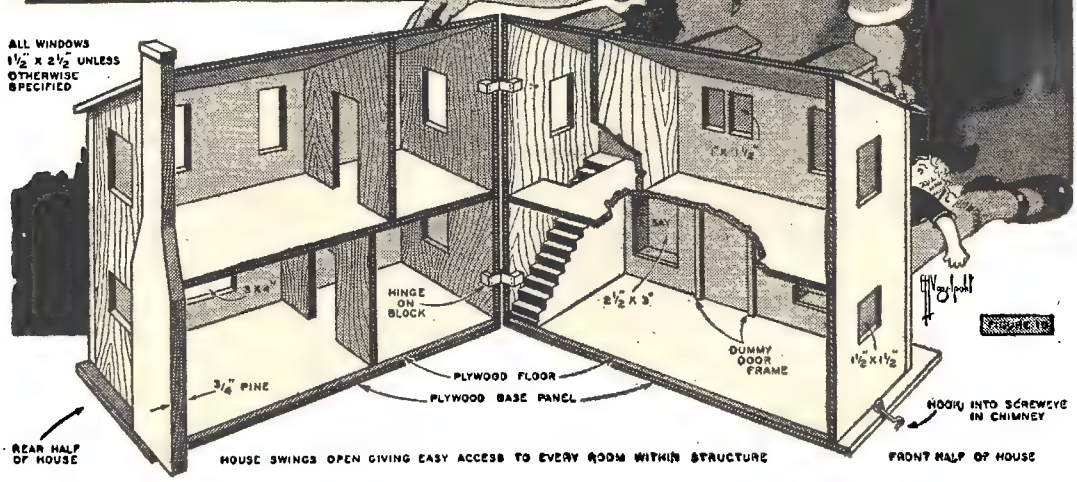
Dormers are simply dummies made of solid blocks glued to the roof. A window effect is made by painting the end of the block blue, placing celluloid over this and gluing a built-up sash on it, Fig. 2.

Windows with sashes are made as shown in Fig. 7. First, a rectangle of celluloid is glued to the window opening. The celluloid should overlap about ⅛-in. all around. Dummy

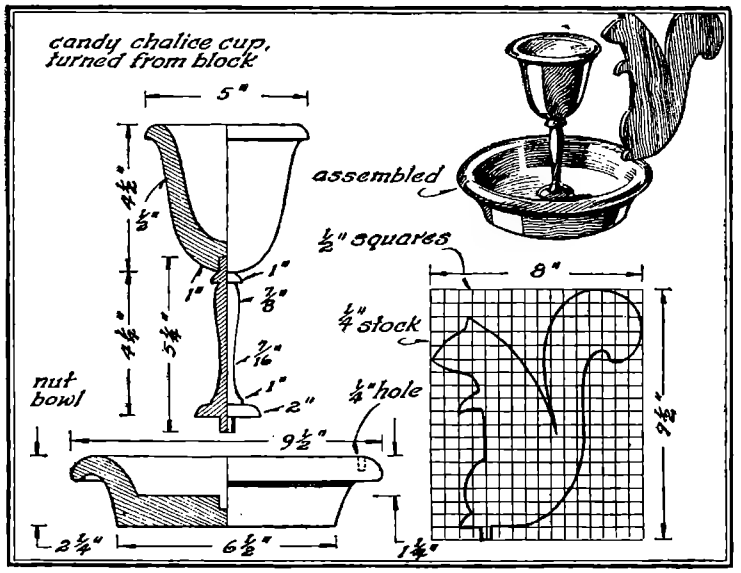
[*Continued on page* 134]





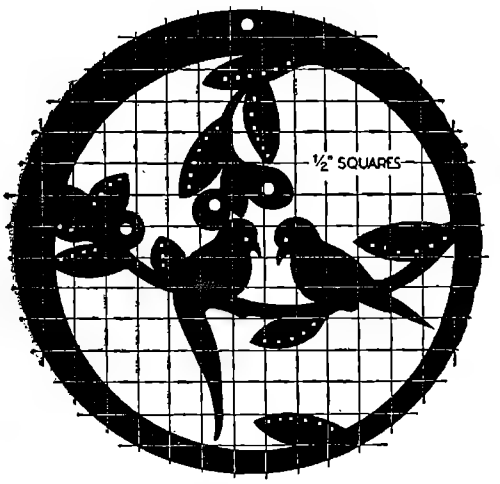


GIFTS from the WORKSHOP



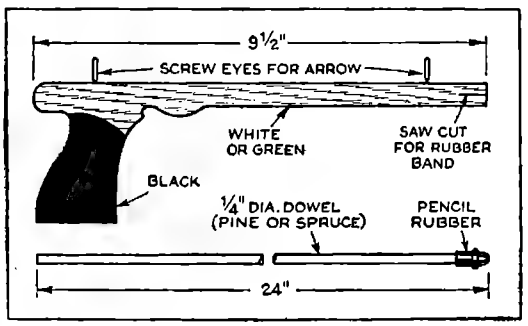
Squirrel Candy-And-Nut Bowl

THREE separate pieces are turned for this candy-and-nut bowl, which has a chalice-shaped cup for candy, and an alert, interested squirrel cut from ¼-in. stock and perched on the edge of the nut bowl. The chalice cup is turned from a block 4½-in. high and 5-in. square at the ends; the stem is turned from a piece 5¼-in. high and 2-in. thick, while the bowl is 9½-in. in diameter and 2¼-in. thick. The turned shell of the cup is 1-in. thick at the bottom, tapering to ½-in. at the lip. The turned measurements of the stem are shown, while half-inch dowels are turned at the ends, the upper dowel fitting in the base of the cup and the other in the center of the bowl. The bowl has a turned-over edge as shown, and is hollowed out to a depth of 1¼-in. The bowl measures 6½-in. across the bottom. Bore a quarter-inch hole in the edge of the bowl to take the dowel whittled at the base of the squirrel cut out. Cut out the squirrel as shown in the half-inch squared diagram, the block being 9½-in. high and 8-in. wide, of quarter-inch stock. Use walnut, French-finishing the turned pieces on lathe before assembling.—*G. E. V. H.*



Cutout Silhouette

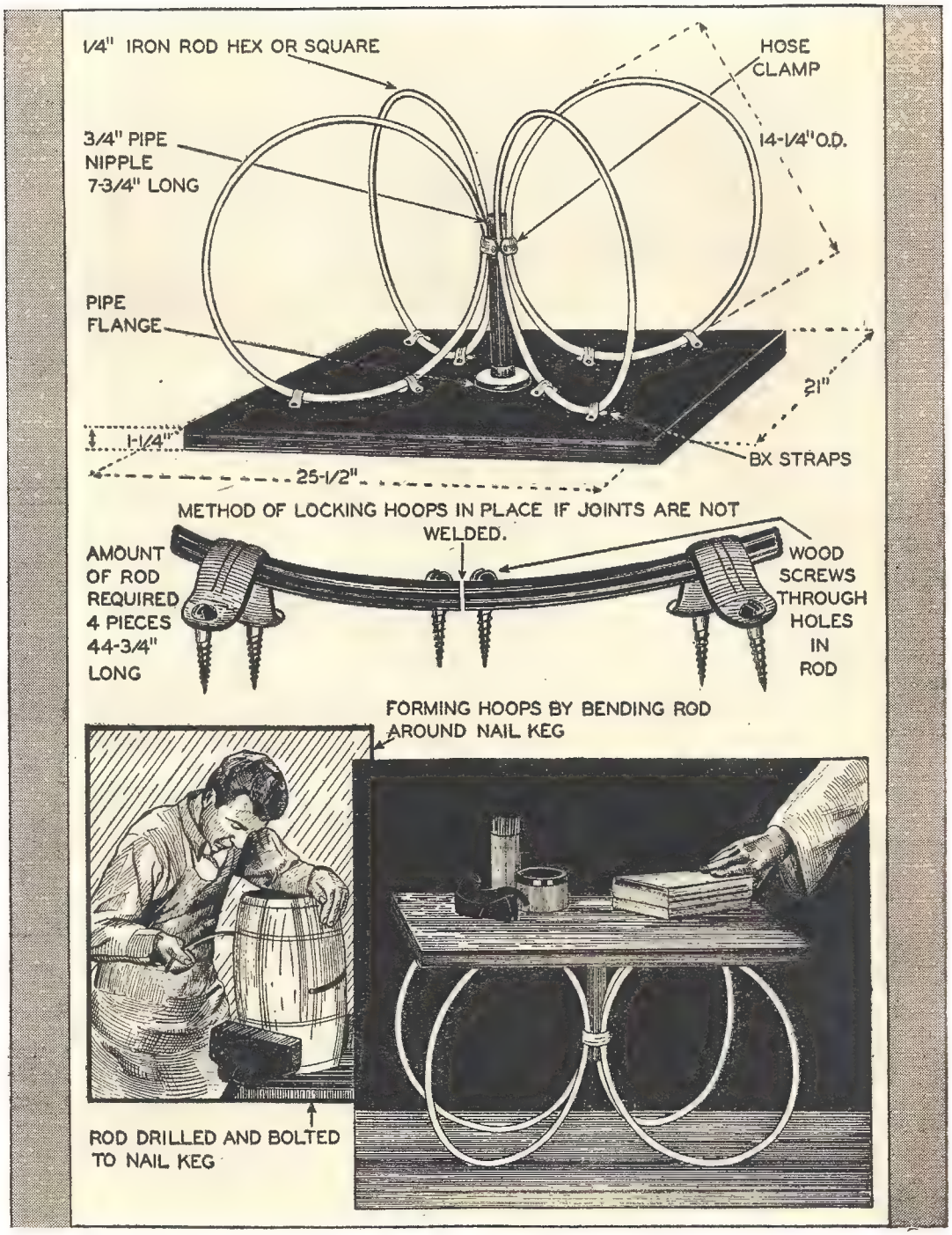
THIS type of hanging cutout is especially striking when hung on a light wall. Scrap plywood or composition board may be used. Merely saw out and paint black. Such plaques may range from 4 to 8-in. in diameter.—*D. V. H.*



Arrow Gun

THIS arrow gun will tickle the fancy of Junior. Made from a scrap of white pine, it is cut to shape, sanded and two screw eyes are turned into the top to act as arrow guides. A saw cut in the front of the barrel holds a No. 32 or 30 rubber band. The arrow may be a small dowel, or better still, shaped and sanded from white pine for added lightness. Paint the gun grip black, the rest green, yellow or orange. Gun has nice range and accuracy but may be used indoors safely.—*D. V. H.*

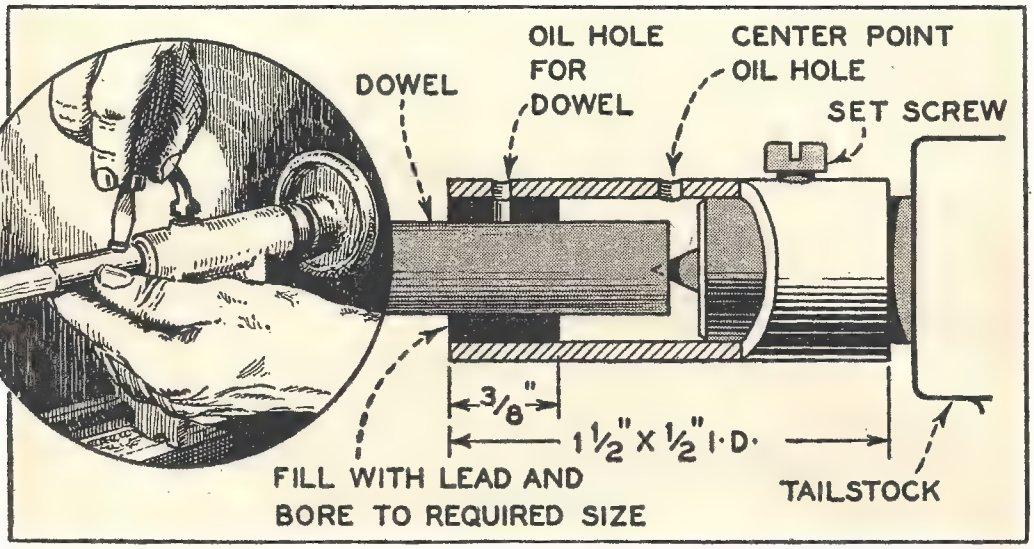
MODERN HOOP-LEGGED TABLE


1/4" IRON ROD HEX OR SQUARE
HOSE CLAMP
3/4" PIPE NIPPLE 7-3/4" LONG
14-1/4" O.D.
PIPE FLANGE
21"
1-1/4"
BX STRAPS
25-1/2"
METHOD OF LOCKING HOOPS IN PLACE IF JOINTS ARE NOT WELDED.
AMOUNT OF ROD REQUIRED 4 PIECES 44-3/4" LONG
WOOD SCREWS THROUGH HOLES IN ROD
FORMING HOOPS BY BENDING ROD AROUND NAIL KEG
ROD DRILLED AND BOLTED TO NAIL KEG

FUNCTIONAL to the structure, yet the keynote of its design, 4 metal hoops serve as the legs of this distinctive modern table. The top is of wood, to which each hoop is anchored at 2 points by means of metal straps. Rigidity is achieved by further anchoring all 4 hoops at a common point around a length of ¾-in. pipe extending down from the center of the top, to which it is firmly secured with

[*Continued on page* 141]

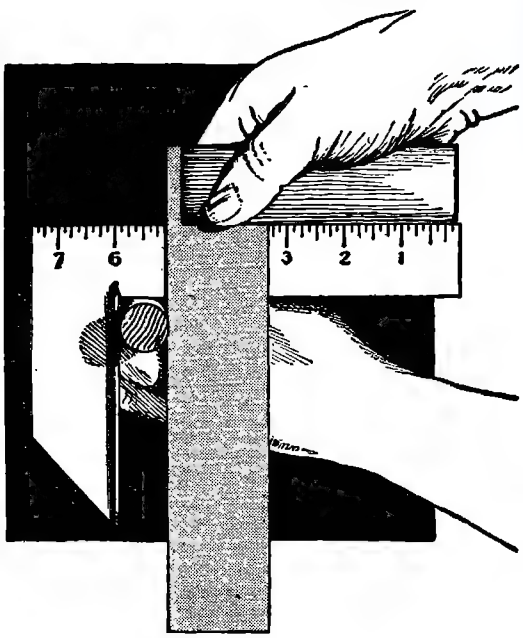
WORKSHOP SUGGESTIONS

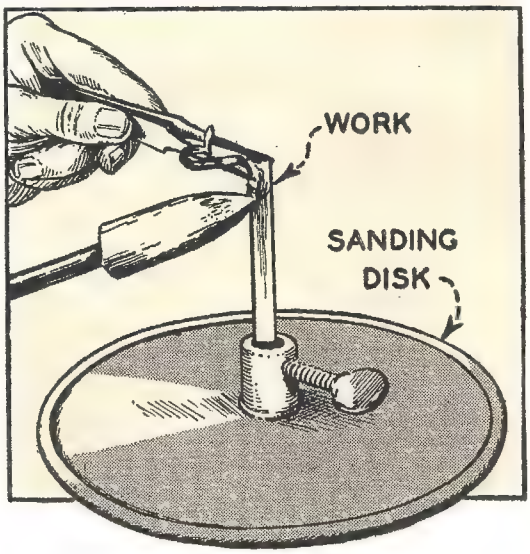


Retainers For Turning Long Dowel Stock

THE usual home shop lathe is equipped with a ½-in. spindle in the tail stock, terminating in a cup and point center. For stock exceeding ½-in. in diameter this center is ideal but when turning long ½-in. dowel material the retaining power of the cup edge is insufficient, and with stock less than this

[*Continued on page* 141]





Sanding Disc Holds Work

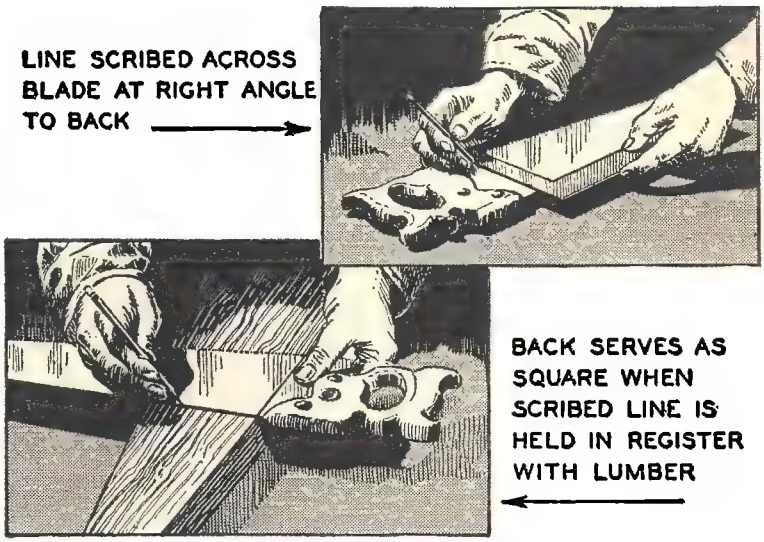
NOVEL use for sanding disk is that shown above. You will find it handy for holding work of various shapes while they are being soldered, filed, etc.—*R. W.*

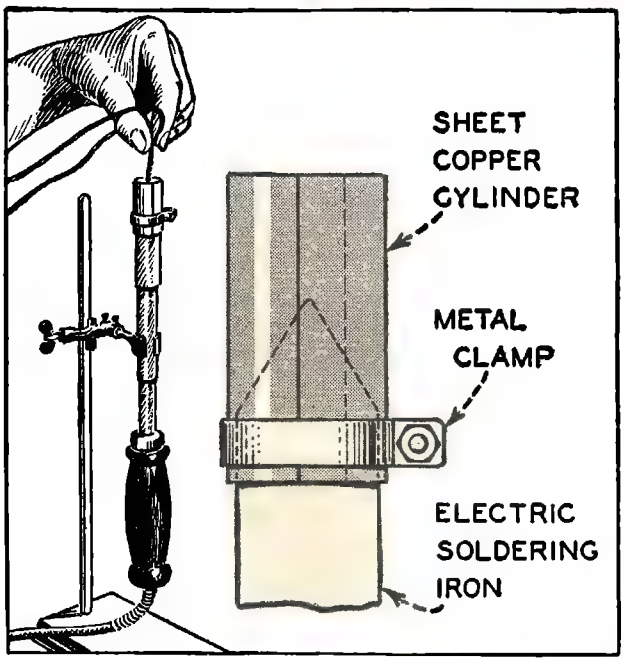
Trisquares Measure Circumference

TWO trisquares held as shown will make a neat substitute for a pair of calipers when the diameter of a circular object is to be measured.—*L. H.*

Straight-Backed Saw As Square

A STRAIGHT-BACKED saw can be used as a square if it has a line scribed across its blade at right angles to the back, as shown at right. With the scribed line held in register with the edge of the lumber, a line ruled along the back of the blade will square off the work with perfect accuracy. —*J. M.*



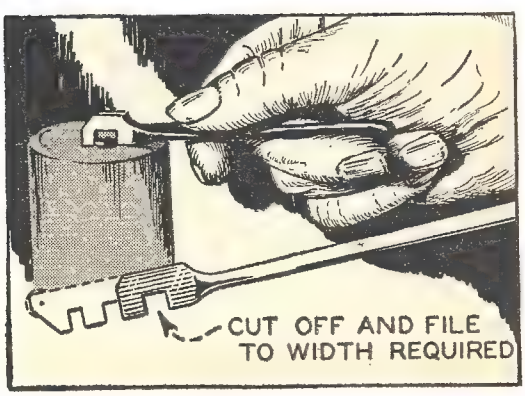


Cylinder Forms Handy Crucible

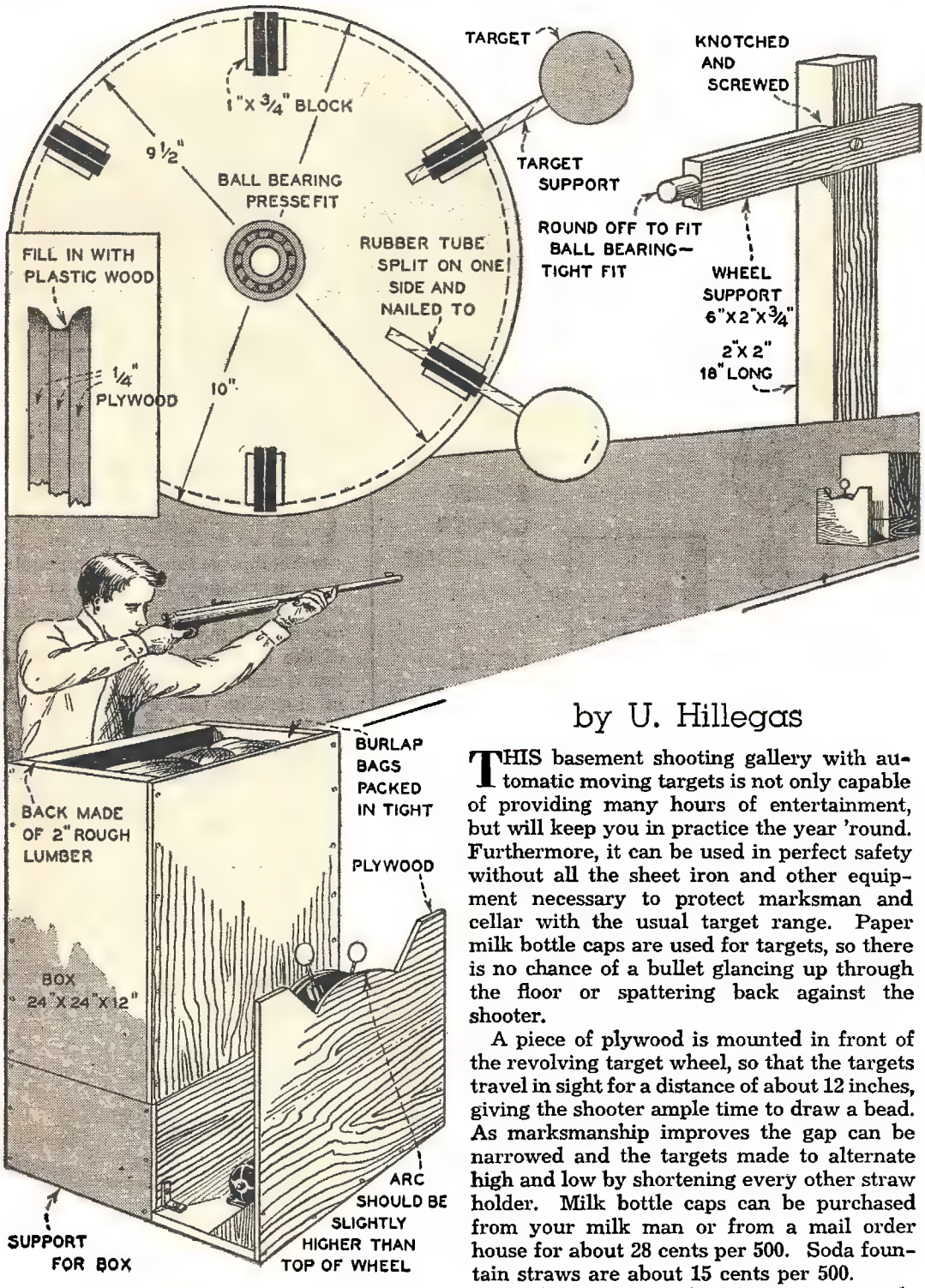
FOR melting small quantities of lead or solder and keeping it in the molten state for any required time a rectangular piece of sheet copper or brass, shaped into a cylinder and clamped tightly to the end of the electric soldering bit will be found exceedingly useful. Use care in forming the cylinder, leaving plenty of lap and fasten it in place with a twisted wire, or, better still, a small hose clamp. In this way there will be no cracks either in the bottom or the side for the melted metal to run out. The soldering bit is clamped in a vertical position while this attachment is being used. This will quickly melt a quantity of lead.—*W. C. W.*

Handy Wrench Glass Cutter

USUALLY worn out glass cutters are thrown away as worthless. However, a very little work will convert them into very useful tools, like the little radio nut wrench shown in the photo. To make this wrench simply cut away a part of the end, leaving one of the break-off slots next to the handle. With a slender file increase the width of this opening so that it will just fit the nut to be handled. A set of 4 of these little wrenches will take care of about anything in the radio or model line.—*W. C. W.*



A HOMEMADE SHOOTING



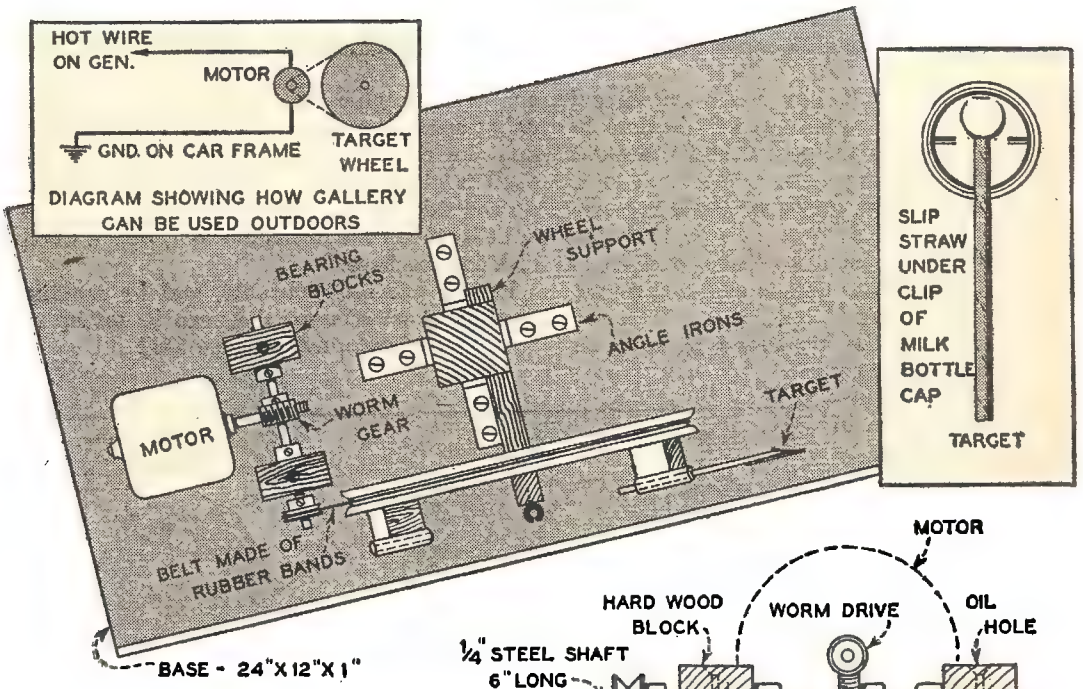
by U. Hillegas

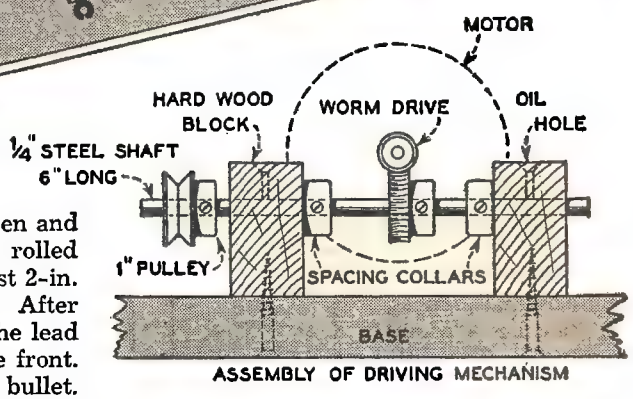
THIS basement shooting gallery with automatic moving targets is not only capable of providing many hours of entertainment, but will keep you in practice the year 'round. Furthermore, it can be used in perfect safety without all the sheet iron and other equipment necessary to protect marksman and cellar with the usual target range. Paper milk bottle caps are used for targets, so there is no chance of a bullet glancing up through the floor or spattering back against the shooter.

A piece of plywood is mounted in front of the revolving target wheel, so that the targets travel in sight for a distance of about 12 inches, giving the shooter ample time to draw a bead. As marksmanship improves the gap can be narrowed and the targets made to alternate high and low by shortening every other straw holder. Milk bottle caps can be purchased from your milk man or from a mail order house for about 28 cents per 500. Soda fountain straws are about 15 cents per 500.

The back stop is a box 24x24x12-in. made

GALLERY FOR THE CELLAR





ASSEMBLY OF DRIVING MECHANISM

from rough lumber. The top is left open and the inside filled with burlap or rags rolled very tight. The back should be at least 2-in. thick, and the front can be plywood. After the front has been shot out, remove the lead from the box, then renew and replace front. This backstop will stop a .22 long rifle bullet.

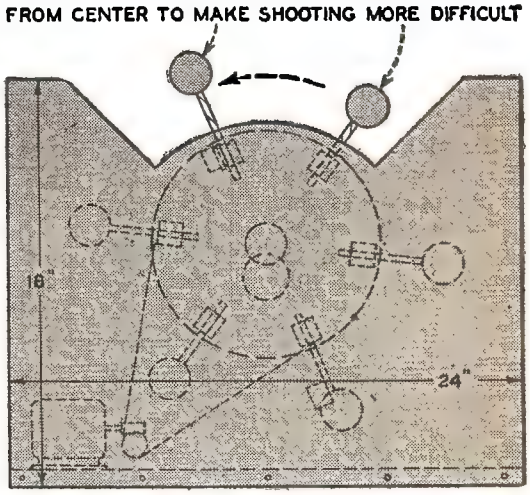
If you wish to use the target outdoors it can be equipped with a 6-volt automobile heater motor. These motors are obtainable at all auto supply stores and are very inexpensive. A heater switch is mounted on the base of the target and two long leads with battery clips are attached to live wire on generator of your car and ground.

For cellar use, however, an electric fan motor furnishes the power, and it can be a small one as very little power is needed. Almost all small electric fan motors have built-in resistors for speed regulation. A speed of 3½ revolutions per minute for the target wheel is just about right. The motor is mounted in a cradle as shown and fastened with two pieces of strap iron, bent down over the top and bolted through the base.

Drive assembly is made from a discarded erector set. A piece of shafting 6-in. long turns in two hardwood bearing blocks which

[*Continued on page* 142]

TARGETS MAY BE SPACED AT VARIOUS DISTANCES FROM CENTER TO MAKE SHOOTING MORE DIFFICULT



FRONT VIEW OF TARGET SCREEN — MADE OF ¼" PLYWOOD NAILED TO BASE

BUILD FAIRVIEW FARM

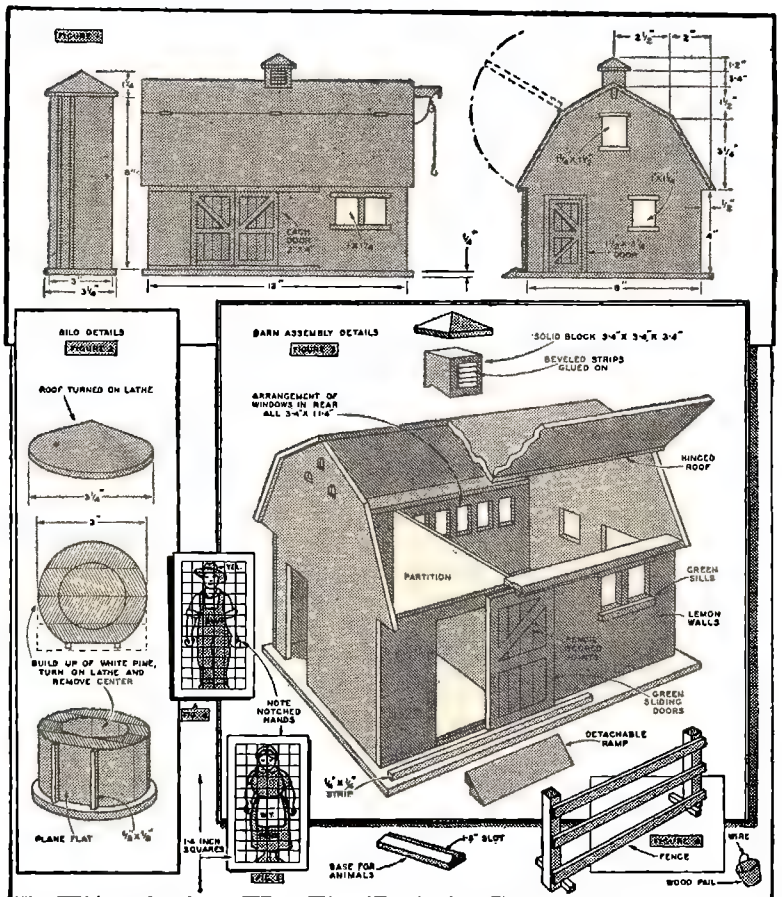
FAIRVIEW FARM has a special appeal because it can be enlarged from time to time and its herds increased, and the child does not tire of it as soon as some other toys. Hen houses, poultry runs, a windmill, a corncrib and many other items can be built for presents on subsequent holidays, and as is apparent, the work is simple and cost negligible.

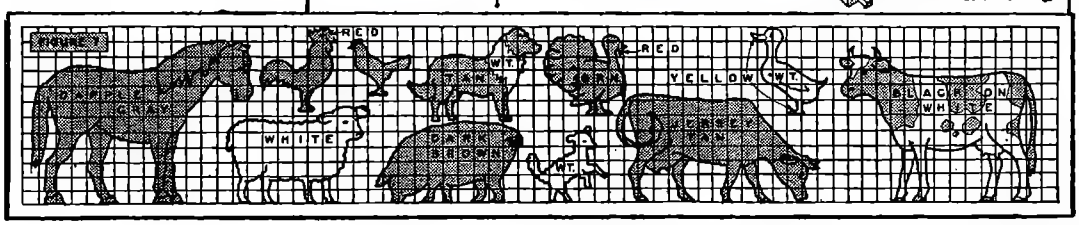
The barn is of the hip-roof type seen on prosperous dairy farms, and overall dimensions are given in Fig. 1. A silo can be built for added interest. Construction throughout is of ¼-in. plywood, assembled with brads and casein glue. Sliding doors open on to a wagon and implement compartment, and one section of the roof lifts to give access to storage space. When not in use the animals, fences, etc., can be stowed away inside. The sliding doors move inside a strip nailed to the baseboard and one under the eaves, as shown. Do not fit them too tight, as in damp weather the wood may swell and bind.

For the silo glue up white pine blocks for turning a 3-in. cylinder. If you wish to remove some of the center later, glue up along the center plane only partially so that the cylinder can be split and the core chiseled out, after which the shell is glued together again, Fig. 2. Strips up the side indicate the storage doors, and a lathe-turned cone forms the roof, with a wood disk for the base.

Fences are indispensable, and by making them in short sections they can be set up to

[*Continued on page* 143]



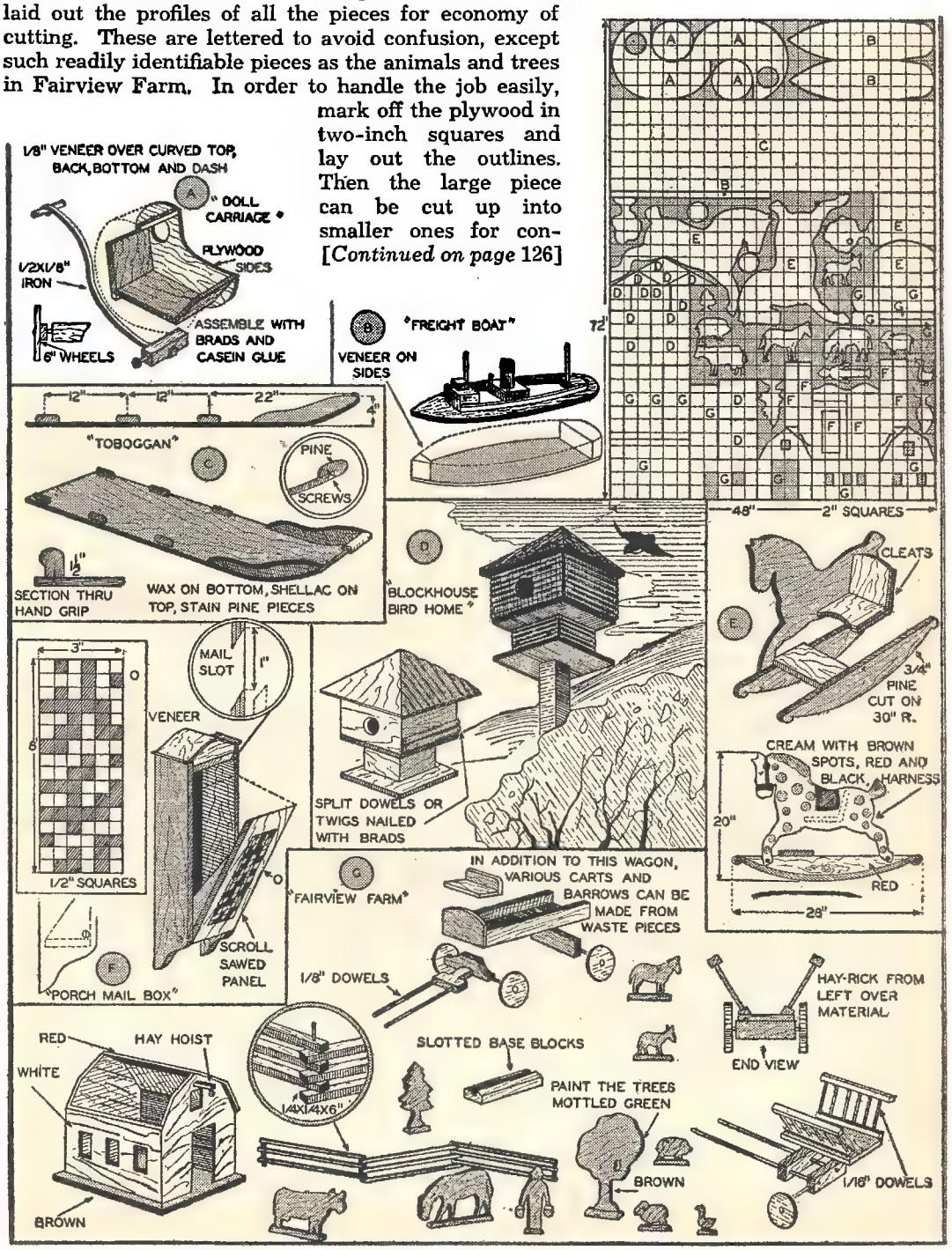


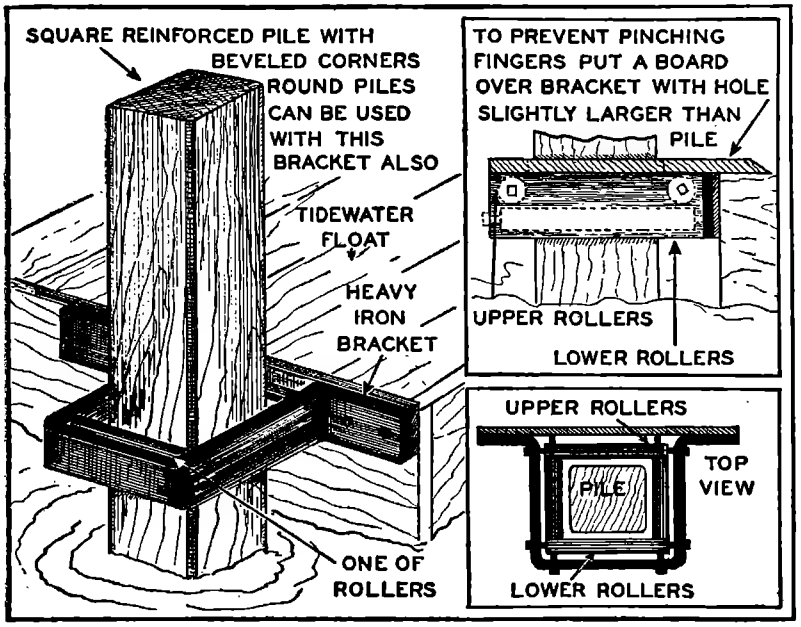
Presents from a Plywood Panel

Scroll saw, glue and brads are all you need to make these.

COLORFUL and decidedly acceptable holiday gifts can be scroll-sawed from a single 4 ft. by 6 ft. panel of ¼-in. plywood, supplemented with a few pieces of pine and ⅛-in. veneer. In the squared diagram are laid out the profiles of all the pieces for economy of cutting. These are lettered to avoid confusion, except such readily identifiable pieces as the animals and trees in Fairview Farm. In order to handle the job easily, mark off the plywood in two-inch squares and lay out the outlines. Then the large piece can be cut up into smaller ones for con-

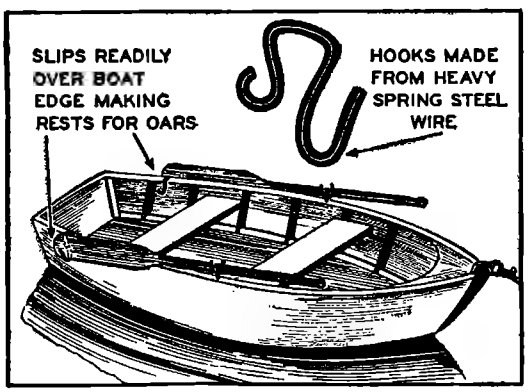
[*Continued on page* 126]




SQUARE REINFORCED PILE WITH BEVELED CORNERS
ROUND PILES CAN BE USED WITH THIS BRACKET ALSO
TIDEWATER FLOAT
HEAVY IRON BRACKET
ONE OF ROLLERS
TO PREVENT PINCHING FINGERS PUT A BOARD OVER BRACKET WITH HOLE SLIGHTLY LARGER THAN PILE
UPPER ROLLERS
LOWER ROLLERS
UPPER ROLLERS
PILE
TOP VIEW
LOWER ROLLERS

Guide For Tidewater Floats

TO PREVENT undue motion laterally caused by waves, guides attached to the shore side of landing floats are very efficient. Only two are required, one at each corner of the float, fitted with rollers made of galvanized pipe over heavy bolts. Heavy strap iron, galvanized if possible, forms the brackets. —*H. S.*



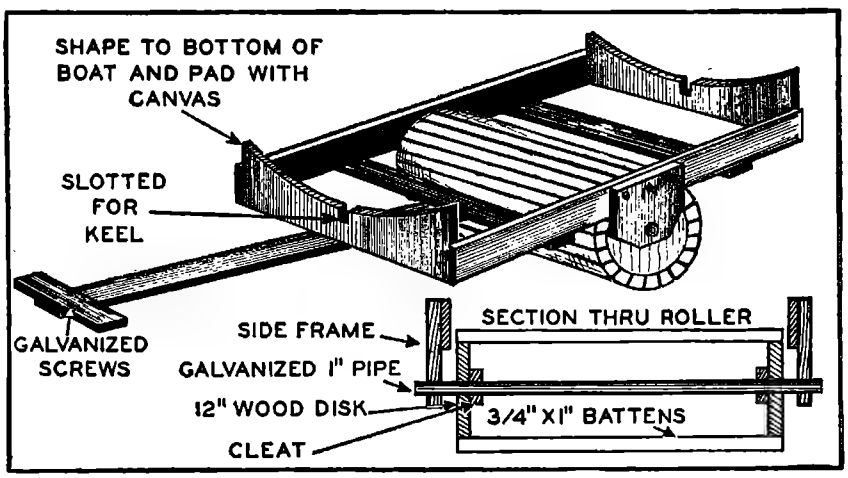
IDEAS FOR

Detachable Hooks Hold Oars

TO PROTECT oars from damage when shipped, and also to prevent water from dripping into the boat, a pair of the little wire hooks shown at left will be found extremely useful. They are slipped over the gunwales and when not wanted can be instantly removed.—*A. H. W.*

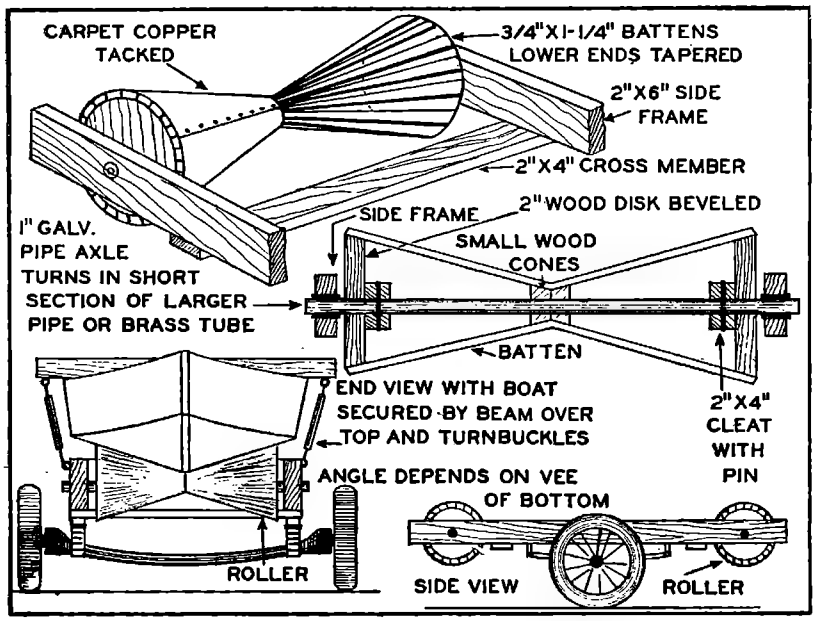
Mono-Roller Launches Light Craft

DUCK boats, kayaks, canoes and light skiffs can be easily launched by one person with the aid of this simple dolly. Rough or scrap lumber is suitable for its construction, but fastenings (screws) and axle must be galvanized to resist corrosion. Dimensions should be laid out to suit your boat. Give all wood a thorough undercoat of red lead.—*H. S.*



Boat Rolls On Trailer

AN EASY way to load a boat on a trailer without excess effort and without marring paint or damaging planking is illustrated at right. Size and slant of rollers depend on hull measurements, but this carrier can be built to accommodate any medium or lightweight boat.—*H. S.*


CARPET COPPER TACKED
3/4"X1-1/4" BATTENS LOWER ENDS TAPERED
2"X6" SIDE FRAME
2"X4" CROSS MEMBER
2"WOOD DISK BEVELED
SIDE FRAME
SMALL WOOD CONES
1" GALV. PIPE AXLE TURNS IN SHORT SECTION OF LARGER PIPE OR BRASS TUBE
BATTEN
END VIEW WITH BOAT SECURED BY BEAM OVER TOP AND TURNBUCKLES
2"X4" CLEAT WITH PIN
ANGLE DEPENDS ON VEE OF BOTTOM
ROLLER
SIDE VIEW
ROLLER

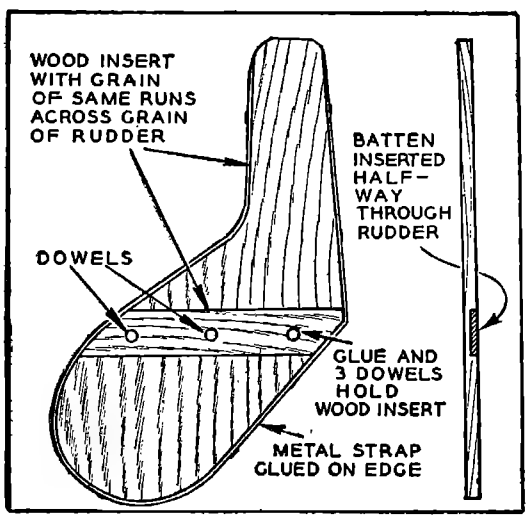
BOAT OWNERS

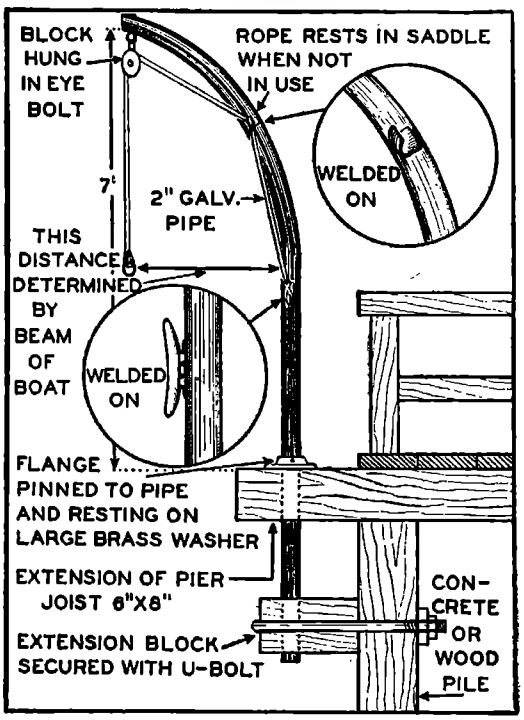
An Unbreakable Rudder

FEW things are more exasperating than to have a rudder split just when the wind is blowing right. To remedy this situation, try the rudder illustrated below.

Make your rudder of good, seasoned wood that has been dried out thoroughly. Cut a 4-in. rabbet at right angles to the grain of the wood one half the thickness of the rudder.

[*Continued on page* 128]


WOOD INSERT WITH GRAIN OF SAME RUNS ACROSS GRAIN OF RUDDER
BATTEN INSERTED HALF-WAY THROUGH RUDDER
DOWELS
GLUE AND 3 DOWELS HOLD WOOD INSERT
METAL STRAP GLUED ON EDGE


BLOCK HUNG IN EYE BOLT
ROPE RESTS IN SADDLE WHEN NOT IN USE
WELDED ON
7'
2" GALV. PIPE
THIS DISTANCE DETERMINED BY BEAM OF BOAT
WELDED ON
FLANGE PINNED TO PIPE AND RESTING ON LARGE BRASS WASHER
EXTENSION OF PIER JOIST 6"X8"
CONCRETE OR WOOD PILE
EXTENSION BLOCK SECURED WITH U-BOLT

Davits, Private Or Club Pier

DAVITS are often virtually essential on small piers, and a great deal of expense need not be incurred in providing them. The drawing above suggests a sturdy, durable, inexpensive installation, most of the parts for which can be obtained in a hardware store.

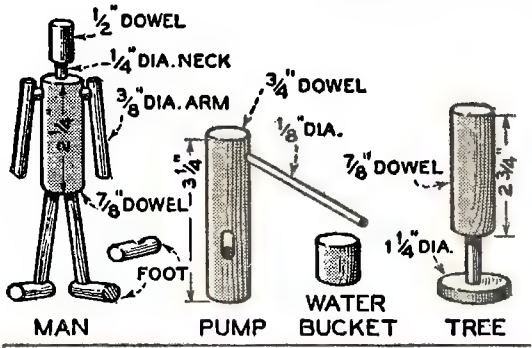
TOYS made from maple doweling

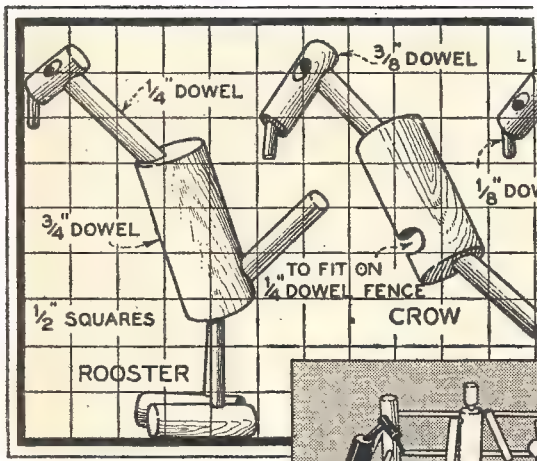
(*Photos on page 79.*)

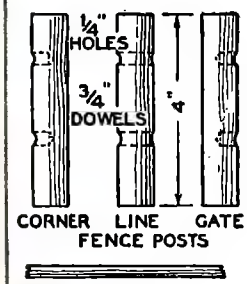
AN INTERESTING and fascinating project for your home workshop is the making of toys from maple doweling, and the kiddies will get a lot of fun setting them up to represent practically an unlimited number of things. All that is needed to make the pieces illustrated here—and many more that may be worked out in your own shop—are a few pieces of various sizes of maple doweling, a saw, and a few drills. The larger pieces are all of ¾-in. and ⅞-in. doweling cut to length, with holes drilled as shown.

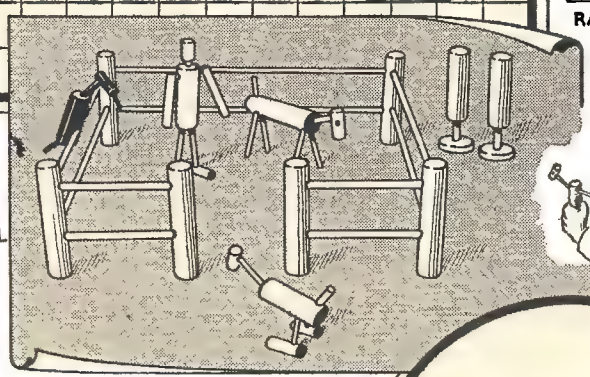
Arms, legs, etc., are of ⅛-in. and ¼-in. dowels which merely fit into the drilled holes

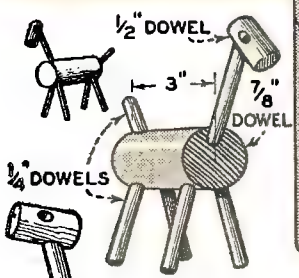
[*Continued on page* 134]





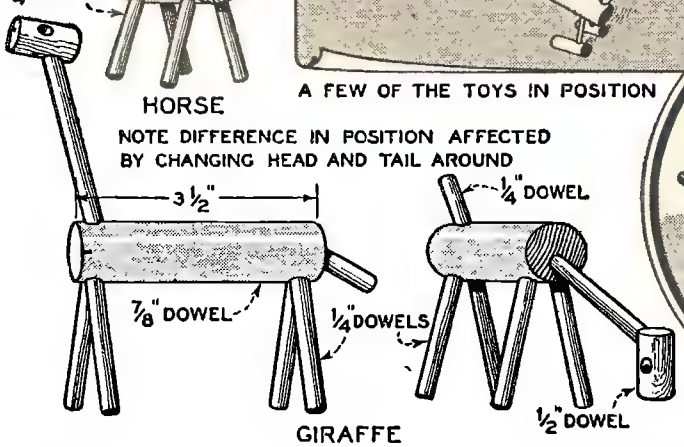


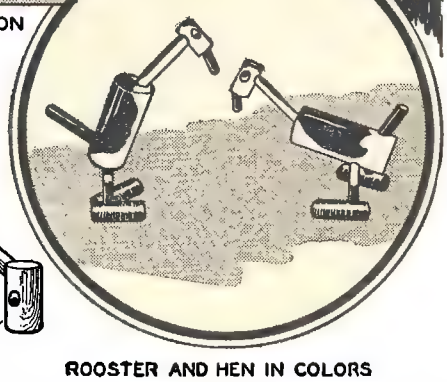




A FEW OF THE TOYS IN POSITION

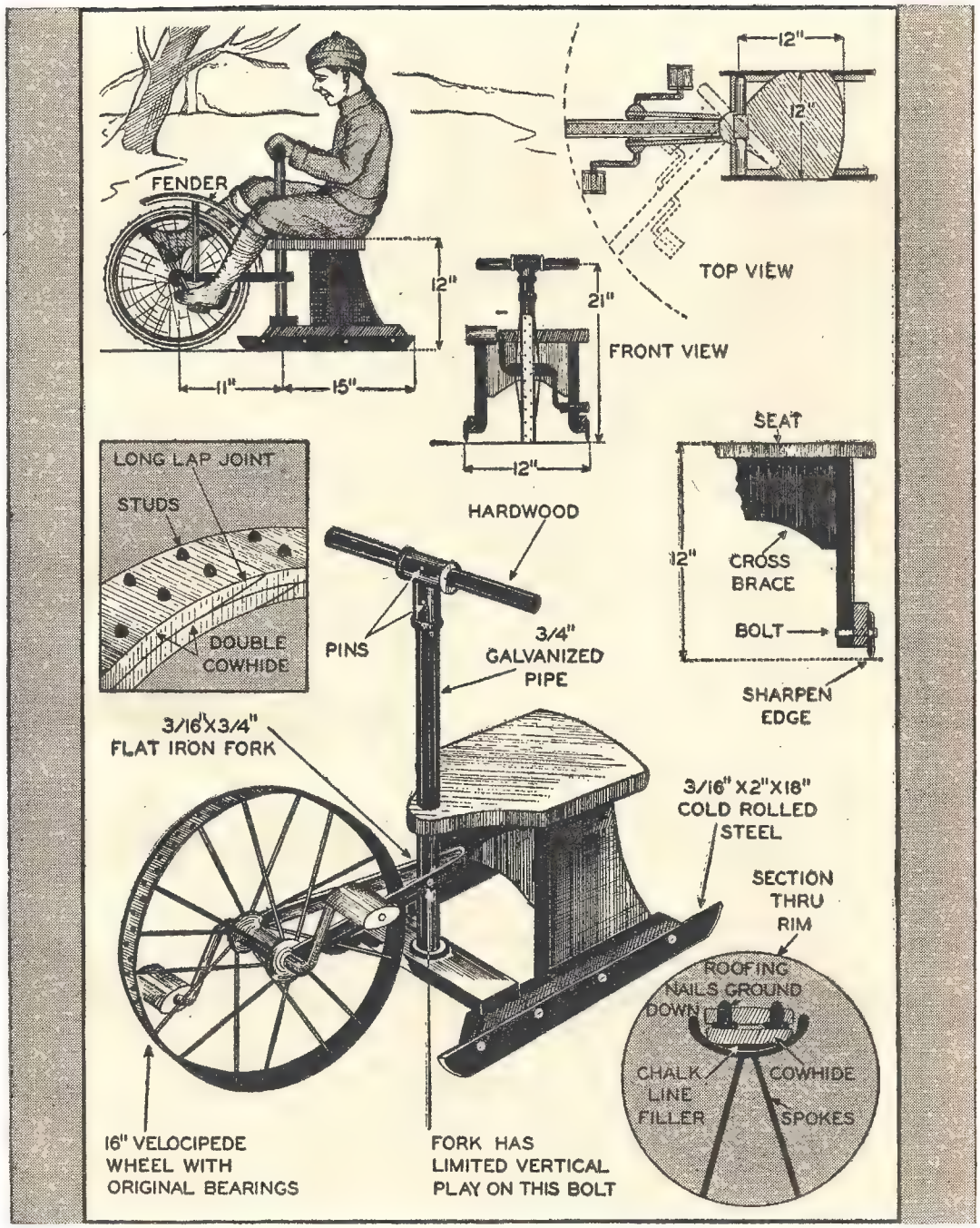
NOTE DIFFERENCE IN POSITION AFFECTED BY CHANGING HEAD AND TAIL AROUND





ROOSTER AND HEN IN COLORS

BUILD THIS CYCLE SLED

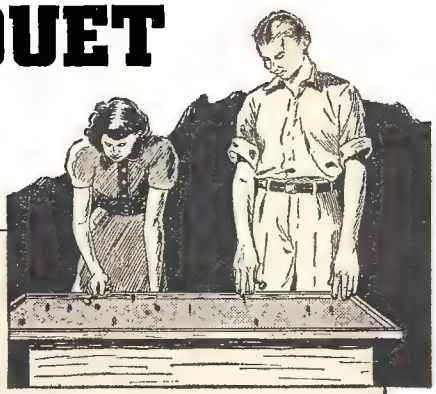


THIS close-coupled little tractor-sled is driven by an old velocipede wheel from which the tire has been removed and a strap studded with spikes substituted.

A 16-in. wheel is shown here, but the sled can be adapted to a larger or smaller one. Remove the tire and wrap the groove of the rim with chalkline until it presents a fairly flat surface, applying shellac as a binder.

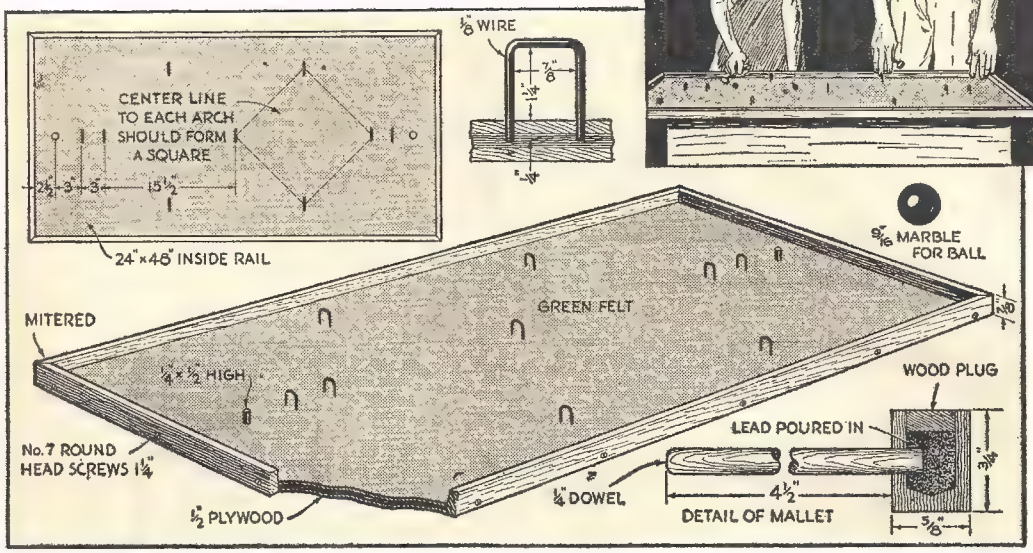
[*Continued on page 143*]

TABLE TOP CROQUET



THIS tiny table-top croquet game will provide as much winter evening fun as the full size game did outside in summer, and two or four can play it.

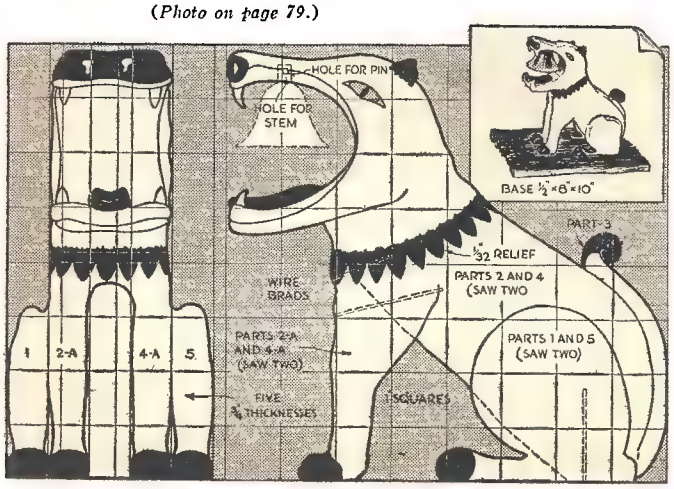
Construction is very simple, being simply a ply-



wood panel covered with green cloth and bound with mitered guard rails. The cloth is glued down all over. Arches are of heavy wire bent to the dimensions given and set in the wood. Note in laying out, the arches form two squares. Short stakes are used at the ends to permit strokes of the mallets over them. The mallets are weighted with lead, as shown. It is melted and poured in after the handle is installed, and a wood plug driven in over. Varnish mallet and guard rails, white-enamel the arches (before installing), paint the stakes and the game is complete. Marbles $\frac{9}{16}$-in. dia. are used, agates preferred. When not in use the game can be stored behind a door.—*Hi Sibley.*

WOOD SCULPTURE
with Jigsawed Blanks

(*Photo on page 79.*)



CARVING a relatively large figure is much simplified if the stock piece or blank is built up, rather than cut from a solid piece. A fine field of art hitherto beyond the scope of the workshop fan is hereby opened up. The amount of effort saved by jigsawing the blank parts is made obvious to the craftsman by examining the leg and mouth openings of the lion. Instead of one large blank piece, this particular statue is composed of eight pieces (possibly scrap material), counting the base, and

[*Continued on page 144*]

Inviting Name Boards
For Country Homes

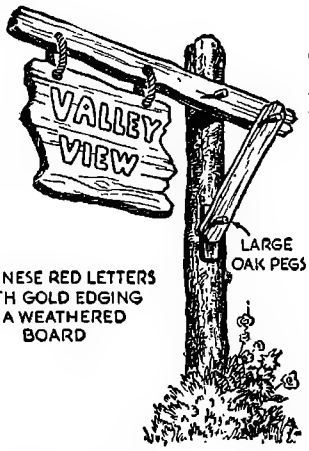
A SILHOUETTE LANDSCAPE SCROLL-SAWED FROM ½" OUTDOOR PLYWOOD AND PAINTED IN NATURAL COLORS

⅛"×¾" IRON BRACKETS ON A 3"×3" POST

BROWN LETTERS ON CREAM, GOLD STRIPE BORDER

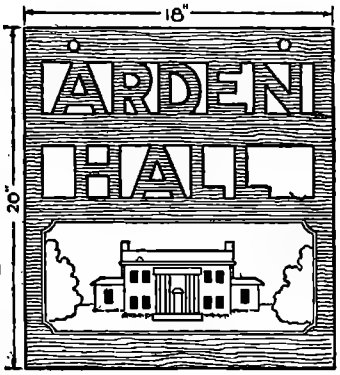
NAME boards add an individual as well as hospitable touch to country and suburban homes and some very pleasing effects are possible with little work. Outdoor or weatherproof plywood lends itself to scroll-sawed silhouettes, and a large variety of subjects are available, each

[*Continued on page* 142]



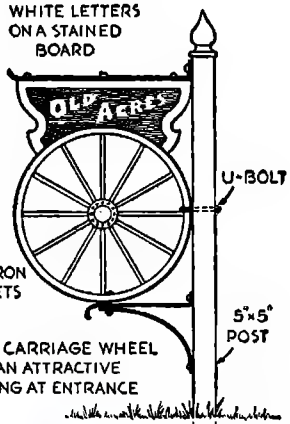
LARGE OAK PEGS

CHINESE RED LETTERS WITH GOLD EDGING ON A WEATHERED BOARD



CUT-OUT LETTERS, HOUSE PAINTED IN POSTER STYLE (½" PLYWOOD)

WHITE LETTERS ON A STAINED BOARD

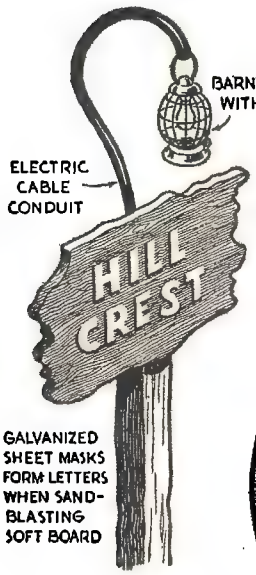


U-BOLT

HEAVY STRAP IRON BRACKETS

5"×5" POST

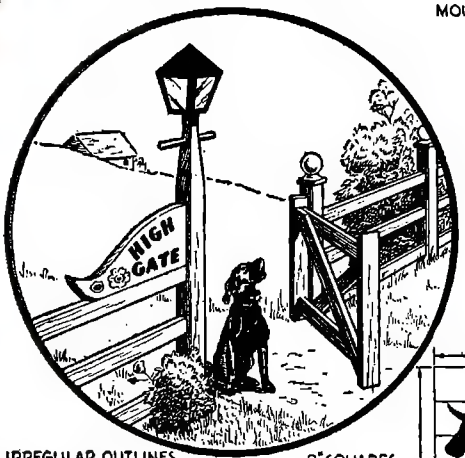
AN OLD CARRIAGE WHEEL MAKES AN ATTRACTIVE MOUNTING AT ENTRANCE



BARN LANTERN WITH BULB

ELECTRIC CABLE CONDUIT

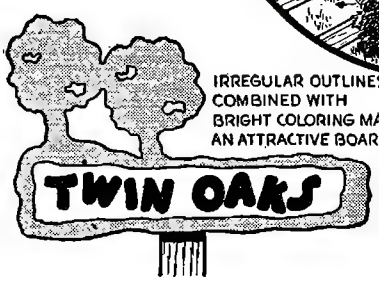
GALVANIZED SHEET MASKS FORM LETTERS WHEN SAND-BLASTING SOFT BOARD



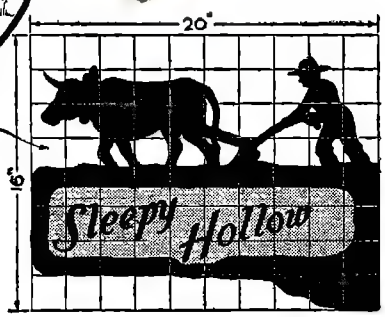
ALL CREOSOTED

GRADE LINE

CLEATS ARRANGED THIS WAY PREVENT POST LEANING



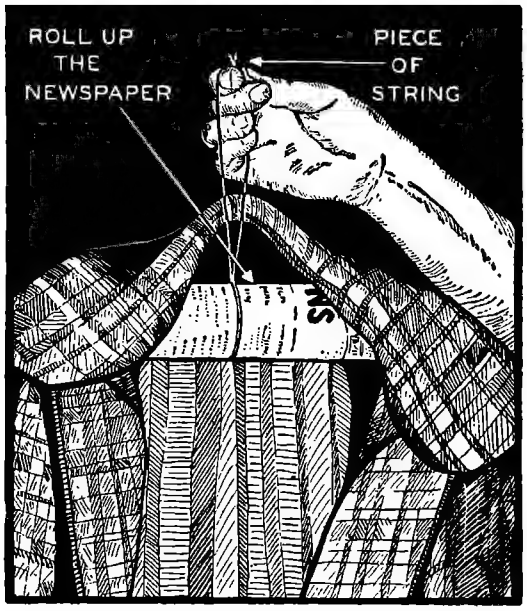
IRREGULAR OUTLINES COMBINED WITH BRIGHT COLORING MAKE AN ATTRACTIVE BOARD



2" SQUARES

A PASTORAL SILHOUETTE IN PAINTED PLYWOOD

Household and Farm

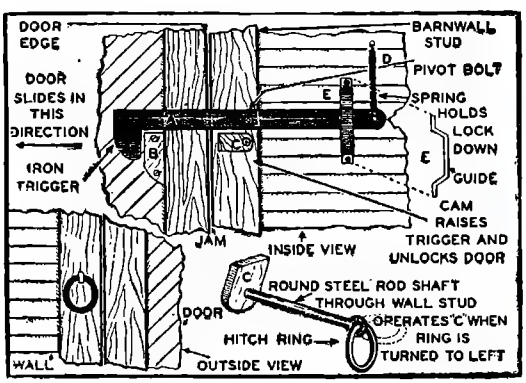


Improvised Coat Hanger

A SIMPLE but efficient garment hanger can be made in a few minutes from a newspaper and a piece of string. Roll up paper tightly and tie it in the middle with string. Loop the end of the latter so that it can be hung conveniently on a nail or hook.—*W. S.*

Secret Barn Door Lock

THE owner of a barn in which was stabled much valuable live stock was troubled with unwanted visitors until he installed the door lock as suggested in the illustration. It proved a good one, and, known only to him and his help, prevented petty thieves and unwelcome guests from invading the place.

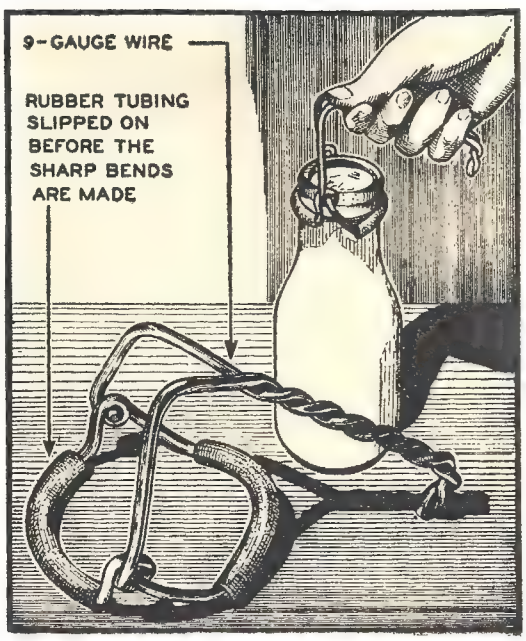


The door was slid closed against the wall. Then an iron latch A was pivoted by a bolt to the wall stud. Under the trigger end a hard-wood block B was fastened to the timber edge of door as shown. D is a spiral spring that raises that end of A so the trigger presses down on B. E is a strap iron guide to hold A near the wall.

The secret part is a round iron shaft running through the edge door timber just ahead of the pivot bolt in A. To this, under A, was riveted or welded a cam C arranged to lift A when the shaft was turned. The shaft ended outside the barn in an eye through which was hung a round iron ring resembling a hitching-ring.

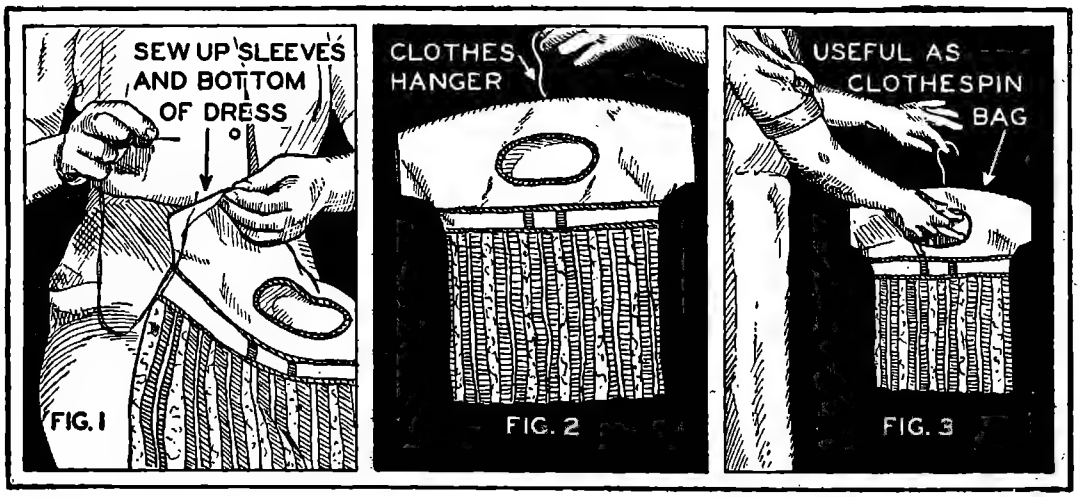
No one could open the door unles the hitchingring was turned so the cam raised lever A. This released it from block B and the door could then be slid open. Normally, the hitchingring presents a very innocent appearance and no one would suspect it to be a secret "Open Sesame" for unlocking the barn door.—*L. B. R.*

Milk Bottle Carrier



THIS is especially useful for children, whose small fingers can't grasp a bottle securely. Coat-hanger wire will do.—*B. N.*

Tasks Made Easier

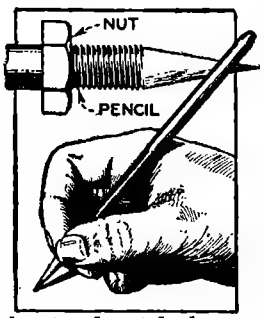


Discarded Dress Makes Decorative Clothespin Bag

A TORN or worn dress is easily made into an unusually decorative clothespin bag in only a few minutes of work. Sew up the bottom and the sleeves and leave the neck open. At the same time, sew in a clothes hanger across the shoulders. This acts as a convenient handle. Clothespins are dropped in through the open neck.—*H. Hayden.*

Reading Glass Shade

READING glasses have a habit of picking up reflections which become very bothersome. An ordinary pint cardboard container, which can be obtained at any grocery store or dairy, will serve excellently as a shade, eliminating this trouble. Remove the lid and bottom and cut a small hole in the side near the bottom. Unscrew the handle of the glass, put glass inside container and screw on handle through the hole.—*W. S.*



Improving Grip On Pencil

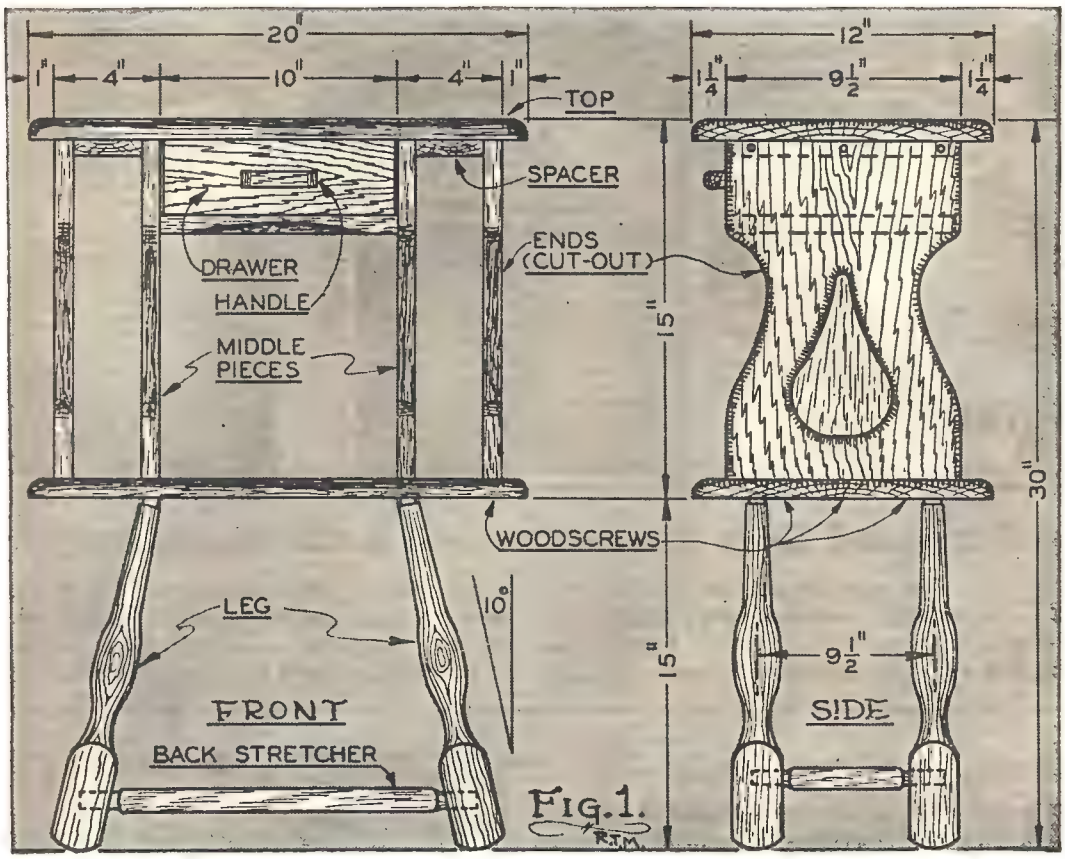
ROUND pencils tend to tire the fingers after they have been used any length of time. The grip can be improved greatly by the simple trick shown. Choose a common nut of the right size and screw it onto the pencil for an inch or two. This cuts threads in the wood. The pencil can now be gripped firmly and the fingers will not sweat.

Be careful not to use too small a nut. The best size is one that scores the wood without forming a full screw thread on it.—*D. V. H.*

Hang Up Brooms

BROOMS will last much longer if they are hung by their handles when they are not in use. If you merely let them rest on their ends, the straw will soon bend out of shape and stay that way.

COLONIAL UTILITY STAND



Early American simplicity of design marks this useful piece of furniture. Photo will be found on page 79.

THE present popularity of maple furniture opens a field of useful work for the home craftsman because he may not only experience the fun of making the piece but enjoy the pleasure and the use of it for a lifetime as well. This is true of the natural maple stand herein illustrated. Only a few evenings are required for the construction and, when you have finished the piece, you will find that the time was well spent. The construction has been simplified to bring it within the scope of the average workshop and there is no monotony of detail to detract from the interest of construction.

Here's an ideal winter workshop project that can be constructed in an average time of about nine hours. Tools needed: Jigsaw, wood turning lathe, wood rasp, brace and bits, block plane, screwdriver.

The bill of materials for this stand may be taken from Fig. 1 and 2 and the first step in the construction is the cutting of the pieces to the proper shape. Start with the ends and middle pieces. These are nominal 1x9½x13½-in. long. After squaring up these four pieces cut the design of the outside edges as shown in Fig. 2 in two of these pieces. These become the *middle* pieces. Then cut out the complete design in the remaining two pieces. These pieces are the ends. Now round all of the edges, not the ends, of all four pieces using a wood rasp. After roughing in this fashion, sand with coarse sandpaper, then with medium and lastly with fine. Too much emphasis cannot be placed upon this sanding as every mark will be magnified when stained.

IN NATURAL MAPLE

by Ralph T. Moore

The top and base pieces are next. Both of these pieces are nominal 1x12x20-in. long. Square these pieces, then plane off the edges and ends to a full rounding chamfer and then sand as above. Next cut out the two spacer pieces from 1x2½x9½-in. long. These need not be maple since they will not be prominent. Drill and countersink the two middle pieces from the side that is to be the inside along the top as shown in Fig. 2. Then screw the middle pieces to the spacer pieces. Lay out the underside of the *top* piece as shown in Fig. 1, and screw the spacers to the top piece. All joints should be glued with *hot* glue to secure the maximum strength. Now screw the end pieces to the spacer pieces. The holes in the outside of the end pieces are first drilled for the size of the screw, then these holes are counterbored with a ½-in. drill ⅜-in. deep. This will allow plugging of the holes with ½-in. dowels to conceal the screws. The dowels are then sanded off. Lay out the bottom of the base piece exactly as the top piece and drill in the locations shown for wood screws, countersinking the holes. Then screw the base piece to the ends of the middle and end pieces. A 1x1x10-in. piece is then rounded as shown in Fig. 1, and screwed to the middle pieces which were previously drilled. This piece forms the bottom of the drawer guide.

The legs are turned from 2-in. square stock to the design suggested in Fig. 2. It will be noted that the edges of the square feet are slightly rounded. These legs are exactly 14¾-in. long and the tops of these are turned to fit tightly in a ¾-in. hole. Next turn out

[*Continued on page* 145]

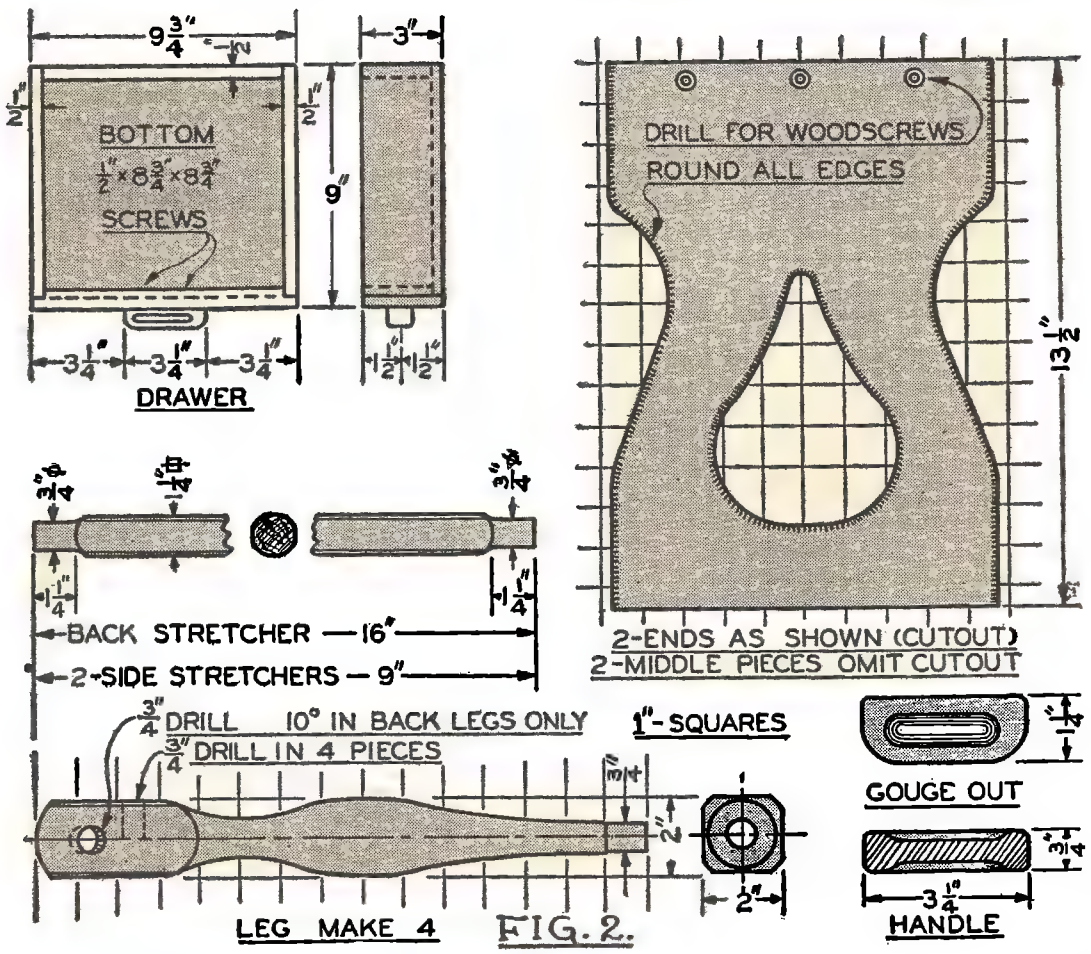
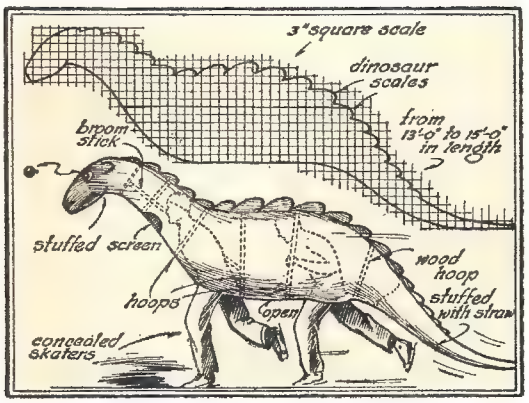


FIG. 2.

Ice-Skating Dinosaur Is Lots of Fun



YOU can have a lot of sport with this dinosaur when you go ice-skating. With a little practice you and your skating teammate can put on a real show of clowning and stunts. From pieces of old cloth or canvas, stitch together the cover and cut it out as shown in the three-inch scale. Overall, the figure should be about 14 feet long. Cut out the two cloth sections, using the scale outline for pattern, and stitch the cover together, leaving an opening at the under side for the skaters' entrance. The imitation scales along the back and tail should be starched and ironed stiffly, or stiffened with cardboard attached to the cloth with loops of thread. Stuff the head with straw, and nail a round piece of plywood or veneer to one end of a broomstick, to form a handle by means of which the fore skater can swing the head in any direction.

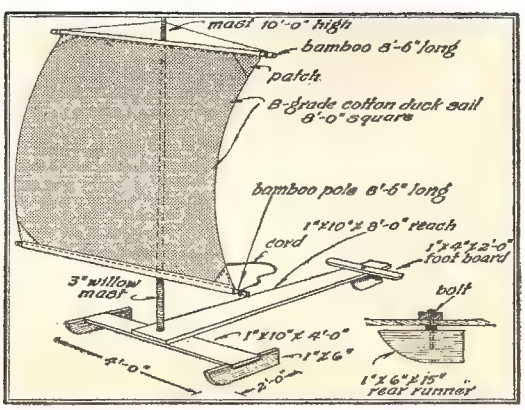
Tack the cloth to the edge of the round board at the top of the neck, holding the packed straw in place. With a few loops of cord, fasten the edge of the opening cut in the underside of the neck to the patch of wire, which serves as a look-out. If you wish, dye the entire cover a medium gray or brown, with the skaters wearing trousers to match the cover as nearly as possible. Cut out and fasten oval patches of white oil-cloth or cotton cloth to the sides of the head for the eyes. Whittle out two wooden balls, 2 inches in diameter. Paint them black and attach them to the cloth eyes with small screw-eyes fastened to the cloth with cord. Use black cloth or ribbon, stitched to the head cover, to form nostrils, mouth and ears.

Wooden hoops, of various sizes, form the frame. Fasten a wooden bar between the sides of the hoop just in front of the rear skater, so that he can hold it to support the rear part of the cover. Stuff the tail section with straw.—*E. V. H.*

Sailing Sled of Wood

USE a one-by-ten board 8 feet long for the reach board of this fast sailing sled. Nail a one-by-ten board, 4 feet long, at right angles to one end of the reach board. Each of the fore runners is a one-by-six board 2 feet long, with one end curved as shown. Cut a notch in the upper edge of each runner so that the ends of the cross board will fit in the notches. Fasten the runners to the cross board with long wood screws. Bore a hole through the reach and cross board where they are nailed together at the fore end, setting a trimmed willow mast 10 feet high in the hole and nailing it in place. The willow mast should taper from a thickness of 3 inches at the base to 1½ inches at the top. The two cross arms of the sail are stout bamboo poles, each 8½ feet long, which are slipped through loops hemmed in the top and bottom edges of the canvas sail. Use either stout muslin or light weight duck for the sail, making it 8 feet square. Stitch down the edges and stitch triangular patches to the corners to reinforce them. Tie the ends of a stout cord to the top cross arm, looping the cord around the top of the mast as shown. The cord tied to the ends of the lower cross arm is used for steering, and is held by the person on the sled as he lies prone on the reach board, his feet pressing against the rear runner stick.

[*Continued on page* 145]



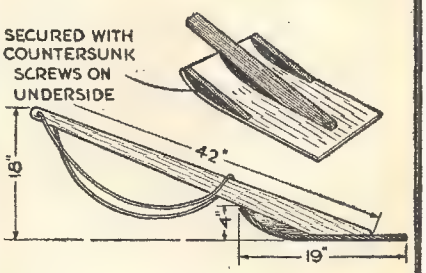
FOUR NEW SLEDS For The Old Slide

THREE of these novel sleds are very simple in construction, and the more ambitious fourth will repay the extra work in the fun derived from it. As a rental proposition it should be in great demand.

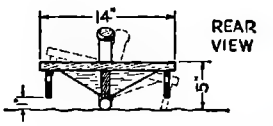
In the "Skoop" we have nothing more than an adaptation of an oversize snow-shovel. A length of steel tubing forms the backbone of the "Slippery Stick."

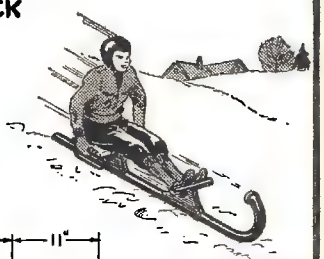
[*Continued on page* 144]

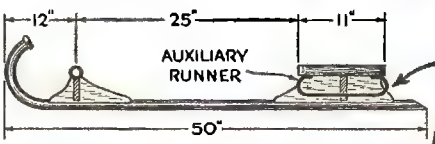
The "SKOOP"

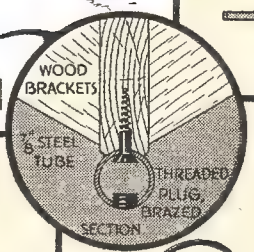


The "SLIPPERY STICK"

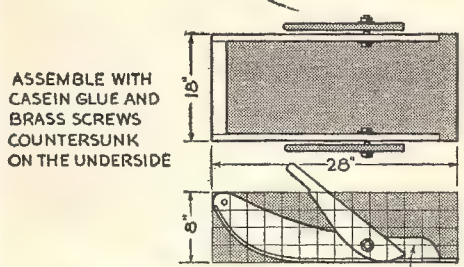


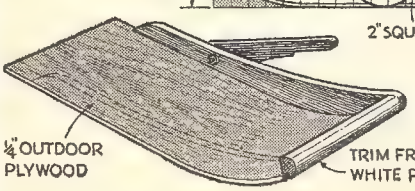




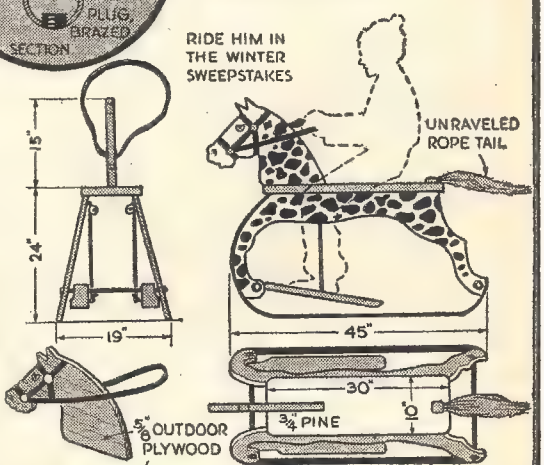


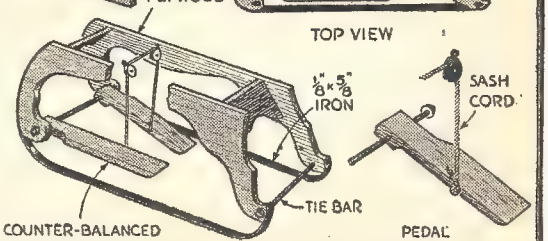
The "NEELY"



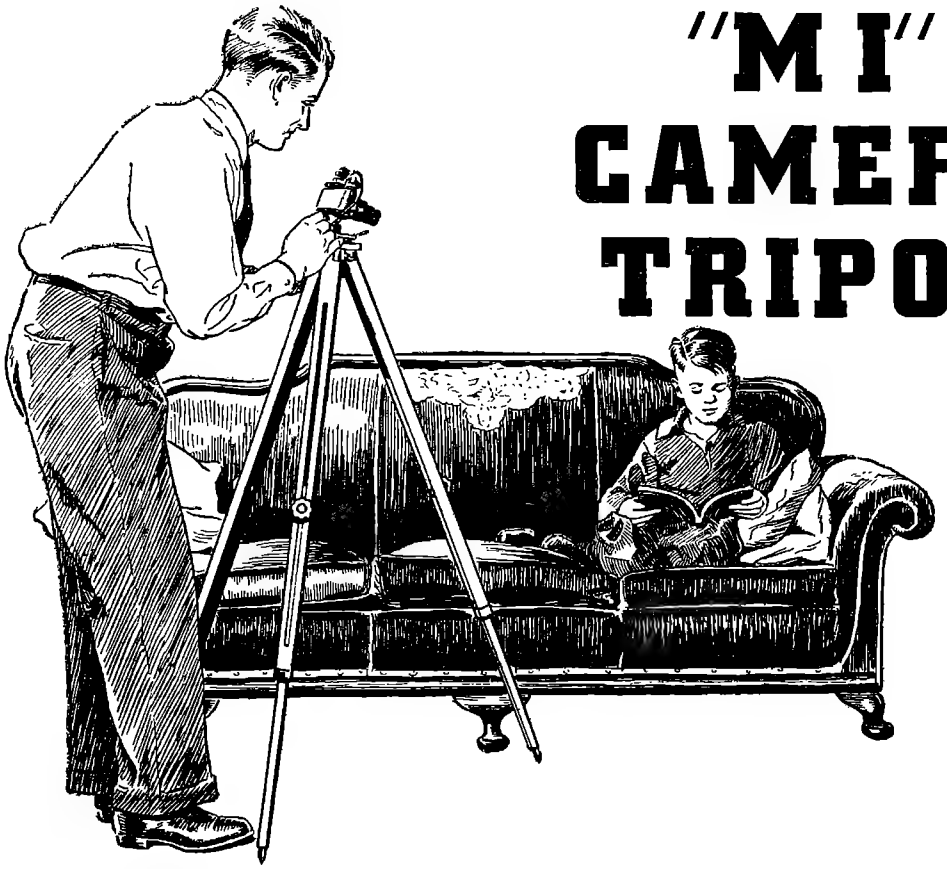


"SNOW BISCUIT"





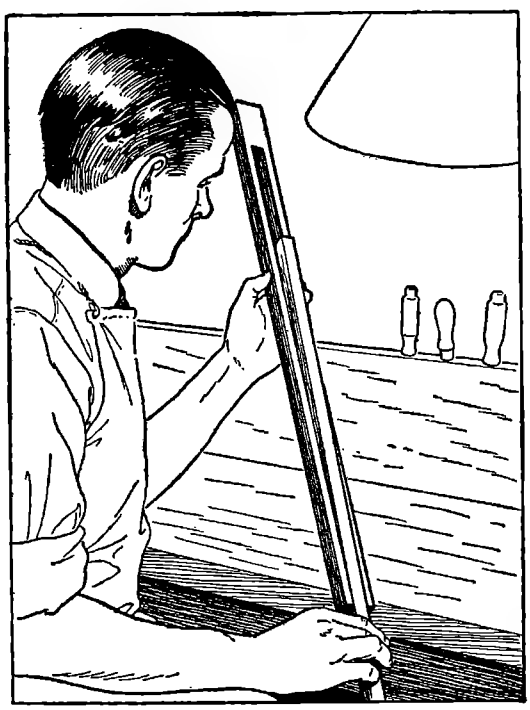
"M I" CAMERA TRIPOD



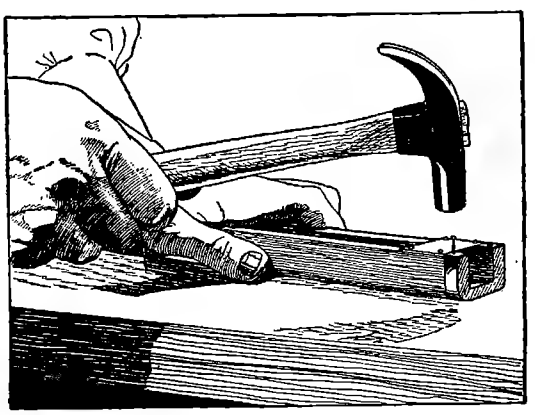
by Earl Ensign

HERE'S a sturdy camera tripod for photo fans. It is easy to build in the average home workshop and will cost about $2.00—which is quite cheap for a good tripod.

The legs should be of mahogany or similar close-grained wood. They are turned out on the circular saw as per drawings. Smooth



The inner leg slides easily within the main leg, yet fits snugly. The sliding parts are not to be varnished.



When the cutting and finishing is completed on the outer leg, add brass strips as shown for a final finish.

them up and finish with linseed oil. Rub in several coats. Be sure not to varnish any of the wood parts that slide together. They will surely stick if you do.

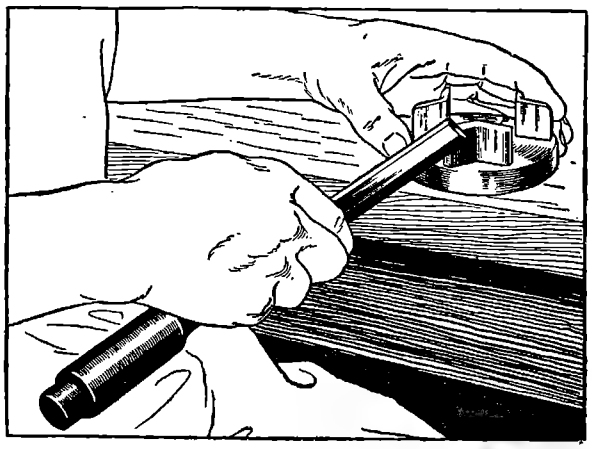
One casting is needed. This is for the head and is of aluminum. A pattern will have to be made for this part. It is a simple one, but make a good job of it as this will simplify assembly later.

The casting is machined on the top. Face it off as shown and bore the holes for the bolts which hold the legs in position. Be careful to get these holes parallel with the top surface of the head. Any suitable bolts can be used but it will look better with specially made ones of brass with nicely formed heads.

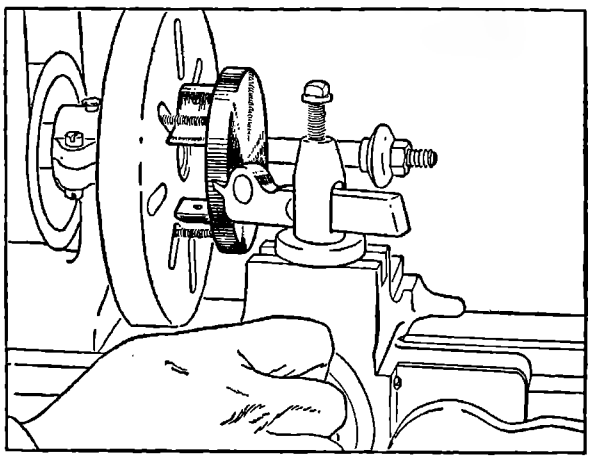
Trim up the ends of the legs with thin brass strips. Use escutcheon pins, which are small brass nails, for this. A square brass plate is nailed across the open end of each leg to hold the extension in its groove. The ends of the legs which fit in the head should also be brass-bound.

The screw for holding the camera is a simple lathe job and needs no special mention. The pins which fit in the ends of the leg extensions are of steel. They should be a tight fit in the holes which you bore for them.

Use one ¼-in. carriage bolt in each leg extension for holding the legs to proper height. These bolts project through the slot in the legs. Any suitable knob with ¼-in. thread may be used for tightening.

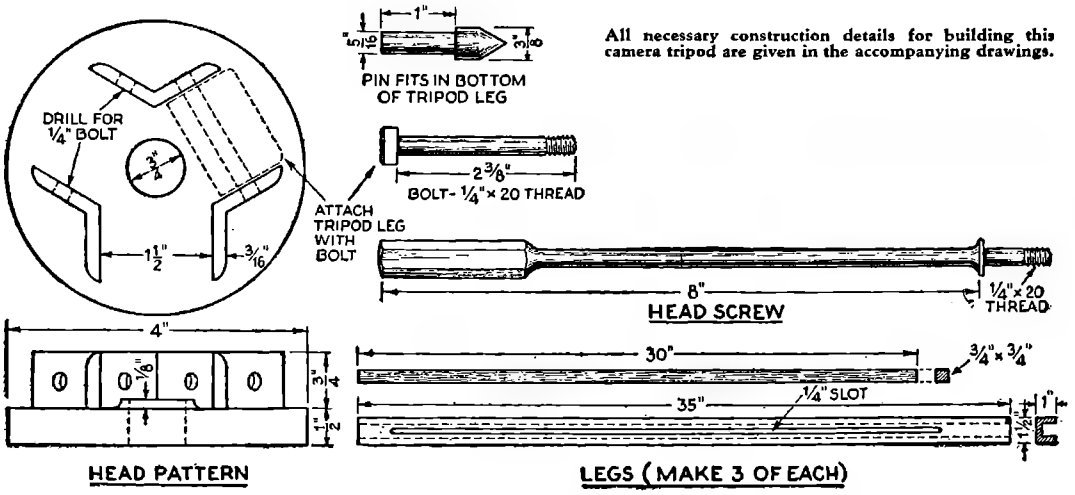


The MI tripod head is cast in aluminum. The pattern is made of wood to exact size. The cost of the casting depends on the accuracy of the pattern so great care should be taken in making it.



After the casting is made, it must be faced on a cutting lathe, as shown above. After it is machined on the top, bore the holes for the bolts that hold the legs in position. Be sure they align.

All necessary construction details for building this camera tripod are given in the accompanying drawings.



AMATEUR PHOTO PUZZLERS

MILKY HYPO

Q. I have been mixing hypo (as it comes in 16 oz. packages) for a long time without any difficulty. Lately, however, the hypo turned milky immediately upon being mixed. I noticed, also, that after fixing film with this hypo that the film dried with a faint blue tone. Could the tone be chemical fog? Could it be due to the milky hypo? What causes the hypo to turn milky?—Louis Rumford, Tulsa, Okla.

A. The blue tint on your film might be chemical fog, but it might also be caused by the milky hypo, which is more likely to be the case. The hypo may be at fault for several reasons. One is that you may be mixing it in water that is too hot. The temperature should never exceed 125 degrees. Above that temperature the sulphite mixes with the oxygen in the air and precipitates free sulphur, with milky hypo as the result. Even assuming that mixing is done below a temperature of 125 degrees, it is still possible to spoil the hypo if the mixture is above 85 degrees when mixing in the hardener. (This is the chemical that comes in the small box with every package of fixing powder.) Under no circumstances should the temperature be over 85 when this powder is mixed in, or the hypo will turn milky and has to be discarded. Milkiness will also occur if there is a deficiency of carbonate in the fixing compound, or if the package of hypo has been allowed to remain on the shelf for a considerable time and has absorbed moisture. To avoid a milky condition, use fresh fixing powder, do not mix at temperatures over 125 degrees and do not mix in the hardener at temperatures over 85 degrees.

STREAKY NEGATIVES

Q. I am trying to develop my own negatives but somehow they come out spotty and streaky. Is there anything that can be done to clear away the streaks?—Weldon Johnson, Neelyville, Mo.

A. Spots on negatives may be due to several causes, such as a dusty developing tank, careless processing, failure to agitate the tank during development, failure to change the wash water frequently enough, and drying film in a dusty room. Dust in the developing tank sometimes settles on the film and remains there throughout the processing with unpleasant results. Failure to agitate the tank at least once or twice during development will also result in spots, although they are more likely to be due to air remaining in the tank. Agitation forces out the air. Spots will also occur if film is insufficiently washed in either fresh water or for a long enough time. When hanging up the film to dry, both surfaces should be wiped lightly with a wet cellulose sponge to remove excessive water, dust or residue that may be clinging to the film surface. It may be possible to correct the condition of your film by re-washing it in fresh running water (temperature about 65 degrees) for 20 minutes. Then hang the film in a dust-free room to dry after first removing excess water from both surfaces with a cellulose sponge.

ACID HARDENING AND FIXING BATH

Q. Can you give me a good formula for an acid hardening and fixing bath?—George Flint, Sioux City, Iowa.

A. An excellent acid hardening and fixing bath may be prepared as follows:

Water (125 degrees F.)	1200 cc
Sodium thiosulphate	480 grams
Sodium sulphite (Dessicated)	30 grams
Acetic acid (28%)	96 cc
Boric acid (Crystals)	15 grams
Potassium alum	30 grams
Add water to make	2000 cc

Add the chemicals in order as given and do not mix in one until the preceding chemical is thoroughly dissolved.

PRINTING CLOUDS

Q. My negatives almost always appear to contain clouds, but when I make my prints the sky comes out blank. What could be the reason for this?—G. E. Harris, Belmont, Western Australia.

A. If clouds show in your negatives, there is no reason why they should not appear in the print—providing the correct paper is used and the negative is correctly exposed in the enlarger. Try several grades of paper. If the clouds seem pronounced in the negative, which, nevertheless appears heavily exposed, this negative should be printed on soft paper. If you use a hard paper, no clouds will show at all. There is a possibility that clouds will not show particularly strongly even when printed on soft or whatever grade of paper the negative seems to require. In that case it might be advisable to dodge in the clouds; that is, give the sky a longer exposure in the enlarger than the rest of the negative. This is done by shading part of the print by holding the hand between the lens and print in such a way as to interrupt that part of the light striking the print area that does not need the extra exposure.

CURLING IS A NUISANCE

Q. When my prints come off the ferrotyping tin they curl and refuse to flatten out. How can I prevent this curling condition?—Vic Feddersen, Charter Oak, Iowa.

A. Prints have a tendency to curl because of the shrinking action of the emulsion. The best way to prevent curling is to soak prints in a solution of glycerine for a few minutes before placing them on the ferrotyping tin. Use glycerine in the proportion of 1 to 5 parts of water. Soak single weight prints for five minutes and double weight paper for 10 minutes after they have been washed and just prior to placing them on the tins. Prepared solutions to prevent curling are also available. They can be purchased from your local camera dealer. The solutions last indefinitely and need only be replenished from time to time due to dilution from water carried over by the prints.

FOCAL LENGTH OF LENS

Q. I wish to use my camera lens in my enlarger in which I expect to print different size negatives. What focal length lens will I need?—Rhine Condray, Monticello, Ark.

A. It is quite possible to use one lens in your enlarger for different size negatives. Naturally, a lens of one focal length will limit the number of times different size negatives will be enlarged. Larger negatives will make bigger pictures than small ones which require lenses of shorter focal length. However, if you intend using only one lens, its focal length must be capable of handling the largest size film you expect to enlarge. In that case, measure the diagonal of the film. For instance, if the diagonal of the film is 4½ inches, the focal length of the lens should be not less than that, preferably 5 or 5½ inches.

PHOTO FANS!

Have you seen the latest issues of GOOD PHOTOGRAPHY No. 3 and PHOTOGRAPHY HANDBOOK No. 4. Get these issues from your local camera dealer and read the 101 ideas for things-to-do-with-the-camera.

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Variation In Exposure And Development

Exposure	Development	Result
Under	Under	Very thin and weak, only highlights visible.
Under	Normal	Thin, shadow detail weak or lacking.
Under	Over	Thin shadows, dense highlights, very contrasty, often fog.
Normal	Under	Thin, flat, detail throughout but weak.
Normal	Normal	Correct density and contrast, detail in all parts.
Normal	Over	Rather dense with too much contrast; detail may be obscured in highlights.
Over	Under	Somewhat thin, very flat, full detail.
Over	Normal	Rather dense, somewhat flat, full detail in all parts.
Over	Over	Very black shadows too heavy; detail lost in highlights.

Chalk Red Tones

WHILE not desirable for portrait work, chalk red tones are very suitable for firelight effects. A print to be toned by the following formula should be a good sepia, fully developed and well washed. If any hypo is present, it may precipitate the gold and stop the toning.

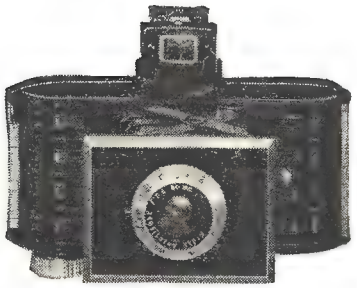
Solution A:
Gold chloride ..... 15 grains or 1 gram
Water ..... 16 oz. 500 cc.
Solution B:
Potassium sulphocyanate ..... 90 grains or 6 grams
Water ..... 16 oz. 500 cc.

Using equal parts, slowly add either solution to the other while stirring to prevent the precipitation of gold. The solution, which is now of a brick-red color, should stand for a few minutes until it clears.

Prints should tone to a chalk-red color in about 15 minutes and should then be fixed in the regular acid fixing bath and washed as usual. The color of the prints depends upon the amount and state of division of the gold deposited. If prints are removed from the bath after a short immersion just after action has been started, they will be a beautiful tone, neither sepia nor red.

The quantity given should fully tone five dozen 4x6 average prints. It may also be used with equal success in toning lantern slides and other glass positives.

1 What $14 camera gives me KODACHROME transparencies?



KODAK BANTAM (f/5.6). No extra equipment; just load with Kodachrome (full-color) Film ... Through modern photofinishing methods, Bantam (f/5.6) also leads to black-and-white pictures 2¼x4 inches . . . Kodak Bantam, with Kodak Anastigmat f/5.6 lens, $14; with Kodak Anastigmat Special f/4.5 lens, $22.50.

2 What camera recently announced is equipped with that great new Supermatic shutter?

KODAK MONITOR SIX-20 (f/4.5 Special). The Supermatic is Eastman's new high-precision between-the-lens shutter, that is unsurpassed anywhere in accuracy. 9 speeds to 1/400 second. Other features: Kodak Anastigmat Special f/4.5 lens, new-type body shutter release, double-exposure prevention, automatic film stop. Price, $42.50.

Only EASTMAN makes the KODAK

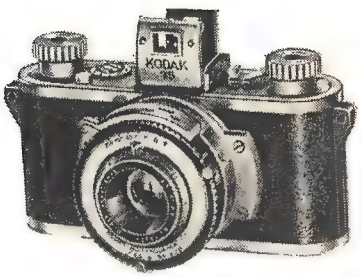
PHOTO FAN'S CHRISTMAS-BUYING QUIZ...

3 What great miniature is a sensational value at its present price?

KODAK BANTAM SPECIAL. Super-precise Kodak EKTAR *f*/2.0 lens. 1/500 Compur-Rapid shutter. Coupled range finder. For black-and-white and Kodachrome full color. Price, $87.50 with field case.

4 What 35 mm. miniature offers high precision at modest cost?

KODAK 35 (*f*/3.5). Gives you what you must have for dependable black-and-white and Kodachrome (full-color) photography. Precise, long-lasting construction. Special *f*/3.5 lens. Accurate 1/200 shutter. Double-exposure prevention. Automatic shutter setting. Exposure counter. Price, $33.50.



5 What movie camera is justly known as the "economy movie maker"?

CINÉ-KODAK EIGHT is the "economy home movie maker." Thoroughly capable, it gives 20 to 30 black-and-white movie scenes—each as long as the average newsreel scene—on a roll of film costing $2, *finished, ready to show.* For color movies, load with Kodachrome Film. Price, $29.50. At your dealer's . . . Eastman Kodak Co., Rochester, N. Y.

GREATEST VALUES IN YEARS

Your Job—Auto Mechanic

[*Continued from page* 39]

general handy man around a garage. It pays the least money and it involves real work, but it gives you a chance to get experience.

That's always the first hurdle in getting any job; what's your experience? You can learn plenty by working around a skilled mechanic for a few months; two to four years shop experience will qualify you as a skilled mechanic yourself.

There are plenty of fine mechanics who don't have a grade school education. But in taking on new hands, employers tend to favor men who have gone through grade and high school. If you have earned fair marks in school, the law of averages says you are intelligent enough to become a superior mechanic. That's the common-sense way most employers have of looking at the education question.

You never really stop learning if you're going places. Trade school training is fine. So are correspondence courses—team up such a course with actual shopwork and you'll not only learn better but faster.

There are two broad classifications of intelligence which can be loosely called the engineering and the literary mind. Your preferences in school will give you a fine clue to your brand of talent. If you enjoyed writing compositions, if spelling was a cinch, if you went in for debating and liked to quote Shakespeare, the chances are a hundred to one that you would be a miserable mechanic. But if you found arithmetic and algebra easy, if physics and chemistry and science and shopwork were favorite subjects, you have the type of mind which will go places in the mechanical field.

If you approach all the repair shop employers in your vicinity and draw a complete blank on your job quest, remember that every business man has a vulnerable spot: the pocketbook. Nothing makes a man jump so high as a stimulus applied to the financial nerve. You are practically certain to know a number of car owners who can easily be persuaded to let you take care of their servicing and repair jobs. Persuade a garage owner that you can swing business his way and watch him make a place for you. At a beginner's wages you won't have to deliver much business to pay your way. You've got your toehold.

Don't expect a union to get you a start as a mechanic. A trade union is not an employment agency. Auto mechanics come under the jurisdiction of the International Association of Machinists. There are about 50,000 of them and a considerable number of skilled men are at present unemployed. Naturally, if you become a union member your local lodge will do all in its power to find a job for you.

An automobile mechanic, by union definition, is a person who has served an apprenticeship of four years at the automobile trade, or one who has worked at the trade for that length of time and can, with the aid of tools, repair, erect, assemble, dismantle and maintain automotive equipment or parts thereof. The minimum initiation fee is $5, minimum monthly dues, $1.75.

That brings us to the vital question, "How much can I make as an auto mechanic?"

You may have merely a vague idea that there is "good dough" in the trade. In the better organized shops, this is true; in other shops the wages may be small, but may be satisfactory from your point of view while you are gaining experience.

The average income for all gainfully employed persons in the U. S., according to government statistics, is $1,350 per year. An exhaustive study by Dr. Harold F. Clark of Columbia University places the average income for skilled trades—which includes auto mechanics — at $1,410 per year. Half the incomes, then, are below this figure, and half above; that's what an average means.

Consult the income chart on page 39 to get a fair idea of what you can make as an auto mechanic, but remember that conditions vary greatly from one community to another. As a beginner you can expect about $15 a week—not less than $10, nor more than $20. At the bottom of the depression skilled mechanics in a representative mid-western city were averaging about $28 a week. At present the average is closer to $35, with some specialists drawing $45 and better.

Many shops pay their mechanics on a flat rate system, giving him a certain percentage of the amount charged the customer for labor. This means that the mechanic spends a good deal of his time waiting for work, and he gets no pay for waiting. A fixed wage is more common in larger, better organized shops, and the mechanic's income is better. Although an 8-hour day is recognized in union shops, and usually in those maintained by dairies, breweries, laundries, and similar businesses which service their own truck fleets, smaller shops often work nine hours or more and sometimes require work on one or two Sundays a month as well.

You will make better money if you become recognized as a specialist, but you have to be, in general, a good all-around man first. There are not so many specialized shops as there were ten years ago, when body and fender shops, brake relining establishments, and ignition specialists were fairly common.

The trend back to the general shop is based on sound reasons. For one thing, the customer doesn't care to scurry from one shop to another to get various jobs done. Also, expensive equipment such as cylinder reboring machines and ignition testing devices is now sold at reasonable prices so the small shop can install machines which only the specialized shops could afford some years ago.

You may, of course, become a welding specialist or a body man, and get a well paid job doing these types of work, but as a rule, in slack periods, you will be expected to know your stuff well enough to fill in on general repair jobs. About

[*Continued on page* 120]

What Strange Cosmic Power Influences Humans ?

BY WHAT RIGHT does man presume that he is the chosen being of the universe and that the earth alone shapes his existence? In the infinite spaces above, tenanted by vast and magnificent worlds, are Cosmic forces which influence the life of every mortal. As iron filings respond to the attraction of a magnet, so too, your acts are the result of an impelling influence upon your will. Just as the unseen Cosmic rays give the earth form and substance, so too, from the infinite reaches, an invisible subtle energy affects the thought processes of every human. Life itself bows to this strange universal force—why, then, should YOU not understand and COMMAND IT? You are like a pendulum either to be swung forward to happiness and the fulfillment of your dreams, or backward into discouragement and disillusionment. Why remain poised in a state of anxiety, uncertainty, and anticipation? Learn to draw to yourself these Cosmic forces which will give your mind the creative impetus that will assure the end in life you seek.

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Your Job—Auto Mechanic

[*Continued from page* 118]

one-third of a shop's volume is in engine repair jobs; one-half, greasing, chassis, brake and fender work; one-fifth, electrical and ignition repairs, according to an analysis of garage records made by Royal F. Jennings.

If there is a specialist in the shop, he is most likely to be a battery and electrical man. He needs a more delicate touch than the general mechanic for he works with small instruments in close quarters. For his higher skill he is usually better paid. Do you repair your own radio—can you take apart a watch and put it together? Then you might well consider an electrical specialty.

One ignition man was called out five miles in the country by an impatient motorist whose car had stalled. The mechanic lifted the hood, took the cap off the distributor, readjusted a wire and said: "Step on her." The motor immediately roared to life.

"You won't have any more trouble. Five dollars."

"Five bucks!" sputtered the motorist. "Why, all you did was tighten up that wire!"

"I'm only charging you two-bits for hooking up the wire," said the electrician. "The $4.75 is for knowing where to hook it."

Dealing with angry customers requires a knack all its own. If you are good at getting along with people, you may step up into a job as shop foreman. But that requires a different set of talents than the ones that make you a good mechanic. Do you like to meet people? Is your business judgment good? Are you steady and dependable? Do you have a knack for getting along with folk? If so, the foreman's job—bringing, as a rule, the highest wages in the shop — is a natural one for you.

It may be, however, that you don't care for the work a foreman does. The born mechanic is often a man who likes being his own boss. He can, and very frequently does, step out and go into business for himself.

You have a number of factors working in your favor if you establish your own repair business. A low-rent building is perfectly suited for garage purposes. You will gradually acquire a few fundamental tools as you work at the trade, at a cost that is not prohibitive. Remember that the vast bulk of repair jobs are fairly simple: valve grinding, carbon removal, ignition timing, brake adjusting. When a job does require a complicated tool it is easy to make an arrangement with some shop that possesses it.

Not once during some two decades of car ownership has a repair shop solicited the writer's business, yet during that period about every misadventure that can befall a jalopy has done its worst to my various vehicles and the amount paid out for repairs and servicing would cause such a headache that I refuse to total it. Take a

[*Continued on page* 122]

Panama Canal Not First To Link American Oceans

If plans for the Nicaraguan Canal, now revived, actually get to the digging stage, America will have achieved three—yes, three—out of four much-talked-of canals for linking the Atlantic and Pacific.

The four main canal routes which have at various times been considered by American engineers are:

First, the Panama route, now a 25-year-old reality.

Second, the route across southern Nicaragua, linking in the San Juan River and Lake Nicaragua. Planned as far back as 1825, this project is now being studied in conference by the Nicaraguan government and its neighbor Costa Rica, while American engineers are again at the task of surveying the ground problems.

Third, the route across the narrowest part of Mexico, the Isthmus of Tehauntepec. A canal at this point, so much nearer the States than Panama, would bring Honolulu more than 1,200 miles closer to New York.

Fourth, a route farther south than any of these, across Colombia near its Panama border. This route actually has once been dug—dug and practically forgotten. It was America's first achievement in joining the oceans, undertaken with no thought of this significance, by a Spanish monk, Antonio de Cereso, and Indian laborers back in 1788.

Recent discovery of an old map showing this canal is reported by the WPA historical records survey. Premilas F. Becnel, going over historic documents at Tulane University's Department of Middle American Research, unearthed this map, and realized its historic value. Continuing the search for more records of the Canal of Raspadura, as it was called, Mr. Becnel and a research student assistant have since located eight more maps showing the canal, and have traced its history.

The canal joined the San Juan River, which has an outlet on the Pacific with a tributary of the Atraro River, which flows into the Gulf of Darien on the Atlantic side.

America's first ocean-to-ocean canal was dug, not for trade, but to settle a boundary argument between two families.

It was a shallow ditch, but during periods of high water Indians began to find the route handy in their canoes, thus unknowingly becoming first to take a short cut water route from one coast of America to the other. Cacao beans for Indians and white people were the early commercial cargoes that crossed the continent via this canal.

A Philadelphia engineer in 1852 found the Raspadura ravine route so filled up that even his light-draft canoe had to be dragged through a canyon on dry land before he could get to the San Juan River and the Pacific.

You're Right—That's Wrong

Correct Answers to Quiz on Page 65

1. True	13. True
2. True	14. True
3. False	15. True
4. False	16. False
5. True	17. True
6. True	18. False
7. True	19. True
8. False	20. False
9. True	21. False
10. True	22. True
11. False	23. True
12. False	24. True

25. False

Attention, MI Readers!

We will pay $1 for each true-false statement which we find acceptable. Statements will not be returned. Address the Quiz Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York City.

Plastic Gunstocks Found More Durable Than Wood

Gunstocks made of synthetic plastic material have been shown to be stronger and more durable than stocks made of the usual black walnut, in tests involving the firing of thousands of shots with the weapons kicking back against a solid block. Rubber butt plates were hammered to pieces, but the plastic stocks showed they could "take it."

The tests were made on sporting arms, but the results are considered applicable to military rifles as well. The new material thus assumes potential military importance, when it is remembered how much difficulty was experienced in getting enough seasoned black walnut for rifles in 1917-18.

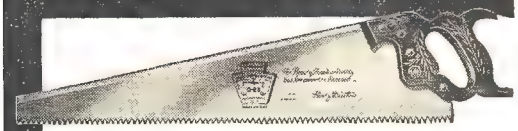
Newest Glider Gadgets

[*Continued from page* 51]

The club's sailplane is an all metal job 20 feet long and with a wingspan of 52 feet. It is equipped with novel flaps, called "spoilers," which work up instead of down, literally letting all the lift out of the wings, so that the glider can come down quickly into small fields.

For finding thermal currents in the air a thermal "sniffer" or gladiometer has been invented by Gustave Raspet, University of Maryland student. It gives the difference in temperature between the wingtips and records relative temperature accurately to within one-tenth of one degree, thus eliminating all guesswork. The fine wires in the instrument are welded together under a microscope.

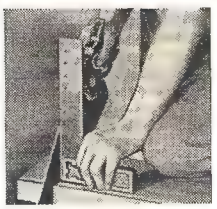
THE SAW OF TODAY



Time, now, to enjoy ownership of a finer saw. The Disston D-23: Lightweight, straight back, narrow blade. True taper ground. Runs easy and cuts fast. Disston Steel. High polish, striped back, beautifully etched. Applewood handle, full carved, weather proof finish, 26" length . . . $3.85
Also Disston D-8, "The Saw Most Carpenters Use." Skew back, 26" length . . . $3.50
Also KEYSTONE made by DISSTON saws, 26" cross-cut $1.00 up; Rip $1.50 up

These prices apply only to United States; for others, write Henry Disston & Sons, Ltd., Toronto, Canada.

and the Hint of the Month



To make a perfectly square end cut is easy, when the face of the board is marked square and a Disston try square used, as illustrated, to keep the saw in a vertical position.

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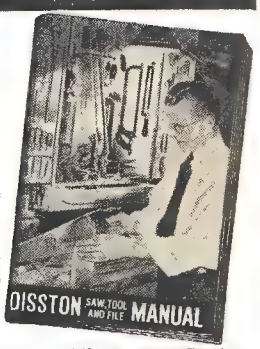

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Your Job—Auto Mechanic

[*Continued from page 120*]

cross section of motorists you know and you'll find that they seek out a repair shop more or less blindly when emergency requires it.

This simply indicates that too many repair shop proprietors are "dead on their feet." They wait for business to come to them. Right there is your opportunity—any mechanic's opportunity. Get a line on a few cars you would like to take care of; talk to their owners, show them where a repair in time saves nine, offer to make a routine checkup now and then. If you impress them as dependable, a sufficient number will be glad to let you take the responsibility of keeping the old bus in fighting trim.

You can make arrangements with a filling station proprietor to refer repair jobs to you, on a commission basis. The average filling-station man is frequently asked to perform minor repairs for which he may have neither the equipment nor the skill. Perhaps you will be able to pick up for a song some car that has been in a wreck, gambling only your time to restore it to fine condition.

It takes enterprise to build business, naturally, but it's enterprise that lifts anybody out of the rut.

Your talents may run along the lines of design. A thorough groundwork in auto mechanics is fine preparation for a spot in the engineering department of a motor car factory, for specializing in Diesel engine work, for getting into the field of aviation motors where the demand for skilled men cannot be filled.

Remember always, as someone has said, that a mechanic knows *how*—an engineer knows *why*. There's a world of meaning in that simple sentence. Keep on learning; sign up for an instruction course; dig into the whys of what you're doing.

Remember, too, that you will have to invest at least two years of your time, and probably four, learning the auto mechanic's trade. You can't afford to invest those years casually. So, in taking the MECHANIX ILLUSTRATED test on page 37, be scrupulously honest. If you don't come through with flying colors, watch for the tests in future issues which may show you your true vocation.

The Craters of the Moon area in Idaho has more volcanic features than any other section of its size in the United States.

Soil for a window box, says Cornell University, should be about three-fourths good garden soil and one-fourth leaf mold, peat, or well-rotted manure, with superphosphate added at the rate of one cup for each bushel of soil.

Ancient Greeks and Romans made safety pins with point protectors.

Blood Solves Crimes

[*Continued from page 47*]

ear, took a tiny blood sample, let it stand until the red cells had clotted, and drew off the clear serum ready to be tested. Was the immunization a success?

Into each of a series of numbered test tubes, he added a little of the kind of blood against which the rabbit had been immunized. Thus, a drop or two of chicken blood was added to the chicken-immunized blood; horse blood into the horse-immunized blood, and so on. Each tube was shaken, put into the incubator and warmed to the approximate temperature of warm-blooded animals.

Soon a heavy white precipitate had clumped at the bottom of each test tube. The chicken-immunized blood was reacting strongly with chicken blood, thus proving itself a sensitive indicator for that kind of blood. Each of the tubes showed its ability to detect a specific kind of animal blood.

A few hours later, in the presence of the suspect and his accusers, a little drama was enacted. Blood soaked from spots on the overalls was added to each test tube. When they had been warmed and were set cooling on the laboratory bench, an amazing thing occurred. Five of them remained entirely clear, but in the sixth—the one sensitive to human blood—a slight cloudiness began to stir. Soon an ominous white precipitate had formed and was settling to the bottom of the tube. His alibi crumbling, the killer wilted and told all.

"Suicide by carbon monoxide!" was the prompt verdict of the coroner's jury in what seemed an open-and-shut case. The victim, a housewife, had been found dead in her own garage, the doors tightly closed, the motor of her car running. But a detective made a shrewd observation. The victim was a small, frail woman. To shut the door as tightly as it had been found required a very strong shove. She did not look as if she had possessed that much strength.

With nothing more than a hunch to guide him, he took a sample of her blood to his laboratory, and put it into the spectroscope. Peering through the eyepiece, he saw two brownish bands darkening the green and yellow portions of the spectrum. That's the way normal blood always looks—and instantly the detective knew he was on the right track; for if carbon monoxide had been present in the blood, these bands would have been shifted toward the green of the spectrum. The woman had not breathed any of the exhaust fumes—*she had been dead when the motor was started!* A few hours later the case was closed with the confession by the husband that he had killed his wife to collect on her insurance, then tried to cover up the crime by making it look like suicide. Again, blood had told.

Hay fever would be reduced about 90 per cent if the ragweeds and wormwoods could be completely eliminated.

Taming The Twister

[*Continued from page* 58]

office keeps buzzing day and night. Out at Miami's million dollar airport in August of this year, weathermen were on their toes. A storm sweeping toward the peninsula. Meteorologists wanted that storm diagnosed. They had a new, amazing hurricane X-ray to try out. They called it the radiosonde. They wanted to know something of the structure of the storm winds, how high they blew in the upper airs, and other things as complex, but important.

Dangling from two helium inflated balloons and a small parachute, the radiosonde swung into the substratosphere, just as the black storm clouds broke over the coast. Here, the sand or ballast balloon burst. With nothing further to delay swift ascent, it shot into the upper airs, as high as twenty miles. Expansion collapsed the supporting balloon, and the instrument dropped earthward.

All during its dizzy ascension, a mechanical voice in the form of a tiny radio transmitter spoke to a ground instrument in meteorological code, jotting its observations. The uncoded results were sent to the chief weather bureau office in Washington. Some day, weathermen, using the radiosonde, may type hurricanes like pneumonia, and determine just how severe and far reaching a storm will be, and whether the public should go to the trouble and expense of boarding up.

A little knot of fliers at the U. S. Coast Guard Air Station, gaze apprehensively at the skies. They know the storm signs well. A yellow glare which would turn crimson by sunset. Winds blowing in gusts. A little rain, powder fine, drifting. A misty sun, going in and out all day long.

An advisory is handed to one of the fliers. It's from the Miami Weather Bureau, and reads:

"Jacksonville to Florida Straits. Moderate N/E. winds, freshening off coast, increasing N. E. winds, probably reaching gale force over extreme South portion and possibly of hurricane force in Florida straits tonight."

The fliers begin rolling out the patrol planes. Each carries a horn shaped amplifier fitted to the window ledge of the radio compartment. Through this the pilots will broadcast the storm advisory to those below. He speaks into a tiny microphone strapped to his wrist. The airplane amplifier and microphone are developments of Coast Guard engineers, their contribution to the state's appeal for more protection. Lime growers, farmers, fishermen, spongers and others who live in the isolated forks of coral that make up the lower east coast have come to know and talk of the planes with the blaring loud speakers as "Voices From the Sky."

Skimming over the Keys, one of the fliers spots tiny figures in the lime groves below. The drone of his motors reach their ears and he sees their turned-up faces, as they stop work to follow him.

[*Continued on page* 124]

$10.00 SAVED per dollar spent—a fair average for SMOOTH-ON No. 1

SMOOTH-ON No. 1 has a value far out of proportion to its ridiculously low material and application cost, and invariably pays a very high return to the householder who does his own tinkering. Home mechanics appreciate the ease of making Smooth-On repairs (without heat or special tools), the quick readiness for full-capacity service, and the reputation for competency which these repairs give to those who make them. Every one likes the speed with which a Smooth-On job gets things in good working order again after a breakdown or leak has caused annoyances.

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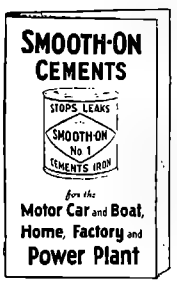
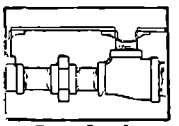
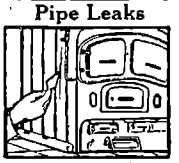
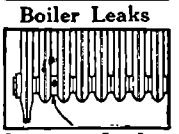
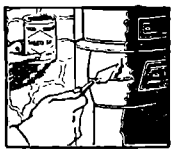



Pipe Leaks


Boiler Leaks


Radiator Leaks


Fire Pot Leaks

Smoke Leaks

Tank Leaks

Furnace Gas Leaks

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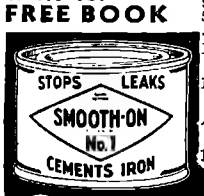

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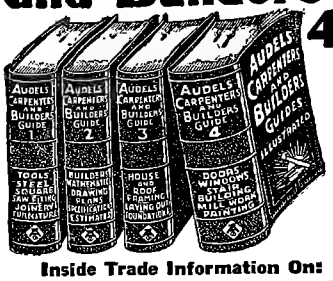
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Taming The Twister

[*Continued from page* 123]

Not that planes are so uncommon, even in these remote places, but ships rarely drop so low here. He cuts the buzz of his engines to a purr and flings the warning from his amplifier, as he drifts not more than five hundred feet above the snaky mangroves. Then he sweeps around the Key once more in a broad circle, and returns to blare, "If you have understood this warning, please let me know by stretching out your arms."

Farther South the plane swoops low over an island of fishermen, lying dangerously flat in the high seas. The pilot stares down on thundering combers. He knows that broadcasting here will be useless. His voice would be scattered by the winds. So he reaches for a small, square box, stained a brilliant yellow and stenciled, "Message Inside" in black letters. This is the message block. He drops it over the side of the ship, and a long, white ribbon marked urgent trails behind. If it falls into the sea, it won't sink, because it's cork.

WPA and Red Cross engineers went to Tavernier and Upper Matecumbe in the Keys. "We're going to build you community shelters that big winds won't budge, and homes that won't fly away," they told the natives.

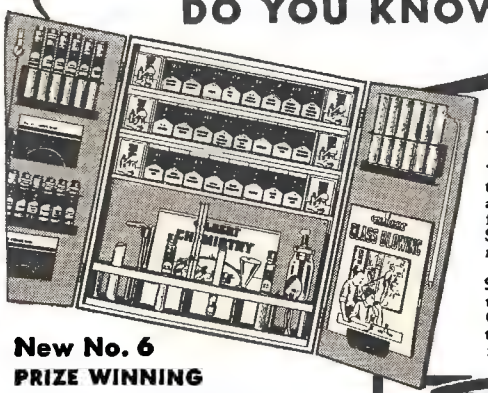
The people watched curiously as the shelters took shape. They saw the foundations locked deep in coral rock. They saw the walls and roofs bristling with twenty-three tons of highly tempered steel, made slip-proof so it wouldn't turn under wind pressure. They gazed in wonder at the steel sash windows with their wired, quarter inch panes, built high near the ceilings, and at the doors, lifted far above the ground. They were relieved. No water from high tides could possibly get in these.

Nothing was left out. An independent pump and power plant. Spacious auditoriums for eating, sleeping, even recreation. Large kitchens, equipped to serve the population of the Keys. Contrivances on the roofs for storing away rain and converting it into good drinking water. And best of all, the people could stay comfortably inside and laugh at the winds, no matter how furiously they blew. Engineers assured them these shelters could resist velocities of 250 miles. And bad as hurricanes were, they never came near that.

Private residences, too, are models of fortification. Between his family and the hurricane, a home owner has a twelve inch outer wall, a four inch inner wall and a six inch roof slab, all of poured, reinforced concrete. They are surrounded, top, bottom and sides, by eleven tons of double layered steel. Their foundation is keyed into solid rock. Their construction design is monolithic to give added strength. The rain through their drain pipe runs into two reservoirs in the basement. These are separated by a con-

[*Continued on page* 125]

Boys! HOW MANY OF THESE CHEMICAL SECRETS DO YOU KNOW?



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Taming The Twister

[*Continued from page* 124]

crete wall. In event one becomes contaminated, they can rely on the other. And if by some miracle, the winds and sea do get through, there are escape hatches into a roof attic, where the family can remain safe and comfortable until the storm is over.

The day is coming, engineers believe, when the Atlantic and Gulf Coasts, and the Keys and islands offshore, will be dotted by shelters and homes like these. And it's only the beginning, they say. Science and the experts keep on planning new ways, all the time, to protect people and coastlines from hurricane fury. Today, the people of southern Florida are no longer terror-stricken at the thought of a "big blow."

"If the storm comes, we're ready!" they say.

Wet leaves should always be treated as a driving hazard, warns one tire manufacturer.

Contrary to popular belief, dairy cows do not drink much more water in hot weather than in cool weather—experimenters have watched them.

To photograph racing finishes, a new camera records what it sees through an optical slit—replacing the shutter which exposed the outer or inner side of the track first.

A new glue of synthetic resin type developed in Poland is said to afford plywood complete immunity to atmospheric conditions.

There are 101 recognized substances in milk, but no chemist has succeeded in putting them together and getting—milk.

A Bureau of Mines technologist has evolved a formula for a spectacular liquid that vaporizes so fast that flames from gases released will not burn the hand.

A man needs to eat at least 30 pounds of calcium in a life-time in order to provide the amount needed by his bones, teeth, and other tissues.

Freezing is the most promising method at present of preserving baked products fresh.

The airplane altitude record is over ten and a half miles; the altitude record for balloon flight is over thirteen and a half miles.

A flower-scented substance derived from petroleum is being used to flavor poison bait for grasshoppers.

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Shades Of The Gay Nineties!

[*Continued from page* 62]

only a fraction of the amount needed to put the engine and body into running order.

A great deal of color was added to the occasion by the costumes worn by the owners and their friends, who went to no end of trouble to garb themselves faithfully in the voluminous veils, picture hats, long duster coats and big goggles of an earlier era.

Engine trouble was the order of the day and proud owners and skilled mechanics worked hard over their frail motors, priming, cranking and doing anything and everything to get them to go. Success was acclaimed by the onlookers as they cheered temperamental buggies in their spurts around the track at the breakneck speed of six miles per hour.

The events of the gymkhana included several parades of cars of different classes and a sandbag race in which the driver had to steer his automobile over a row of sandbags while a passenger balanced a tray of glasses. Costume judging and exhibitions made up the rest of the program.

On the sidelines and back of the race track were an outstanding group of old models, exhibited for the purpose of showing the fine workmanship and upholstery in these early cars. Observers could readily trace the evolution of the automobile from its carriage-like beginning to the streamlined speedster of the present.

Presents From Plywood Panel

[*Continued from page* 99]

venience in sawing. As the dimensions are indicated in the squared profiles, none are given in the individual drawings, and it is inevitable that a certain amount of trimming and fitting will be necessary. Casein glue and brads are used in nearly all of the assembly, and each piece should be painted in bright colors, excepting the toboggan, which is waxed and shellacked, as specified. Fairview Farm offers unlimited possibilities in adding animals and implements, as well as buildings, from time to time.—*H. S.*

Radio Pictures In The Sky

[*Continued from page* 72]

celebrate the twentieth anniversary of the Radio Corporation of America, parent company of NBC.

This demonstration was widely heralded by the daily press as the first instance of television reception in the skies. It wasn't. Except for the landing feature, an almost identical stunt was put on by the television station of the Don Lee Broadcasting Chain, in Los Angeles, in May of 1932.

Shatter-proof glass with an organic instead of silicate base is being made in Germany.

Turning Pigeons Into Owls

[*Continued from page* 71]

he can be released from an airplane, battleship, mountain top or dense forest.

Fifteen years were necessary to produce these night-spies, as well as the indomitable will to succeed where countless pigeoneers previously had failed. True, other birds have come home occasionally at night, in the years in which Great Britain, France, Germany and other countries were working toward this end. But, though feathered messengers were reaching their lofts in darkness as far back as 1918, success was infrequent and known to be mere chance, and, for every bird that came home, hundreds of others went A. W. O. L.

The crux of the whole problem surrounding the training of homing pigeons is that no one yet knows how or why a pigeon *does* come home. Birds have been liberated thousands of miles from their home lofts, yet they have established an amazing record of success in heading directly for their routes and sticking on the course no matter the obstacle. The most expert private trainers in the country will tell you, however, that, regardless of how close a bird is to his home when night falls, he will find a chimney, a roof or a haystack to nest for the night, getting underway again at the first hint of dawn.

This is not true of the Army-trained pigeon today, and, in case of war, the owners of the 2,000,000 racing birds now in existence would be mobilized quickly to receive the benefit of the technique now known only to the Signal Corps. Only then, would these private breeders—organized into two large national organizations of bird fanciers, the American Racing Pigeon Union and the International Federation of American Homing Pigeon Fanciers—learn the secret of pigeon flying at night.

Are soldier-pigeons important? Well, let's look at their method of operation and then judge for ourselves. The answer is the same in almost every country. Commonly, the birds are in the second line trenches, two lofts to a division, and supply pigeons to 10 stations at the various post commands. In case of attack, the enemy would immediately cut off all telephone communications and jam the radio waves with counter-waves. Runners would try to get through, but when this was found to be too dangerous, the sole remaining communications link would be the pigeon.

Birds would be tossed into the air at points other than their particular post—in order not to draw the enemy's fire to the latter point. And, under cover of darkness, the spy-birds' chances of getting through unseen by the enemy will be heightened tremendously.

There are difficulties surrounding night pigeon-flying, of course. Chief of the troubles which had to be overcome by the Signal Corps revolved around the problem of landing. The birds were

[*Continued on page* 128]

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Turning Pigeons Into Owls

[*Continued from page* 127]

found to be unable to judge the exact position of the landing boards on their lofts, and early experiments resulted in a number of bruised breasts and shoulders, experienced when the winged warriors swooped too heavily onto the landing board. The Signal Corps successfully combatted this difficulty by constructing landing boards calculated to take up the jolt and absorb the shock.

That war-time pigeon flying is important, therefore, no one will dispute; as a matter of fact, bird fanciers actually claim that pigeons won the battle of Verdun for the Allies, inasmuch as the feathered flyers still got through with vital messages long after all other means of communication had been effectively cut off!

But the martial value of the spy-birds actually had its first demonstration early in 1918, at the U. S. Navy lofts at Brest, Bordeaux and St. Nazarre. It was a bird from one of these lofts which definitely saved a British airman's life. Becoming hopelessly lost over the North Sea, the aviator tried for hours to locate his base, as the gas tank registered a dangerous low. Then, when all hope seemed lost, the airman remembered his pigeons. Releasing one of the birds, he fell immediately into position behind it, and, in less than an hour, had made a safe landing at his home port.

Another life was saved and another hero was made!

An Unbreakable Rudder

[*Continued from page* 101]

The rabbet should be cut at the widest part of the rudder blade.

Cut a piece of wood to fill the rabbet tightly and drill three holes through the two pieces. These holes should be ¼-in. in diameter as dowels of the same size will later be glued into them.

Glue and clamp the insert into the rabbet. If you have difficulty in getting a clamp deep enough to clamp the center together, run a good sized bolt and two washers through the center hole and tighten.

After the glue has dried take a metal strap about ⅛-in. thick and ¾-in. wide (depending upon the thickness of the rudder) and screw it around the edges of the blade.—*G. E. B.*

Paint films cannot last and give continuous protection to surfaces which are corroded from under them, according to Industrial and Engineering Chemistry.

Government scientists are working on a method of converting the lactic acid in milk into acrylic acid which is useful in making plastic glass.

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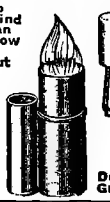

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Village For Christmas Tree

[*Continued from page* 80]

The setting may be either white or green. Many prefer the white base—cotton and imitation snow, or a sheet starched and rumpled into mounds—as being in harmony with the tree and the season. But a green base has a beauty of its own and perhaps greater possibilities for varied and unique effects. For the latter artificial moss is used, obtainable in the dime store. Here gravel may also be purchased for the streets and roads, and in fact almost any article in connection with the toy village. The slight outlay is one of the happiest features of this hobby.

The scene may be laid directly upon the floor, but a platform is preferable both for effect and protection. You can start with a small one and enlarge from year to year as interest and ideas grow. It is best to raise the platform about one foot to allow little children to sit on the floor with their feet under it.

The best place for the train track is around the edge of the platform (and for a realistic bed use gravel between the rails). The train, if electric, may get its power from the regular lighting circuit, stepped down by a transformer.

Telephone poles are an effective adjunct to the railway. These can be made of dowel pins cut into ten and a half-inch lengths. For braces on the cross arms use scraps of brass from a tin shop. Tack beads to the arms to represent insulators. Fine wire may be strung from post to post but No. 50 white thread is just as effective and easier to string and to replace if broken.

If your ambitions run to a village you should put some thought on the general plan before starting. Decide, for instance, where the main village street shall run. Select a chief point of interest and group the other buildings around that. Do, in brief, a little town planning.

Much of the interest, and certainly a large measure of the uniqueness, of a toy village is the result of effort and imagination expended upon it by the family. Homes, banks, garages, stores, all sorts of miniature buildings may be purchased, but if you make them yourself you will reap that much more fun. A church, for instance, can be constructed out of an apple-box. Make a cardboard tower and use colored paper (linings of envelopes are excellent) at the windows to produce a stained glass effect.

Lighting is important to these toy scenes. Buildings may be wired from the floor and lighted by tiny bulbs. Add street lights and your village has something to boast of. These can be made of brass tubes, shaped by filling full of sand and bending in a vise. For lamps use ordinary 12-watt flashlight bulbs, and for wiring a string of Christmas tree lights, the wire being cut apart and pulled through sockets to which the poles are attached. The base of each street light is a pull-apart plug, one-half of which is screwed permanently into the platform.

[*Continued on page* 131]

Village For Christmas Tree

[*Continued from page* 130]

It is the imaginative scope of the toy village that makes it so intriguing. You may start with a bank and end with a chicken coop or haystack (and old brooms, by the way, make excellent stacks). You may even have a zoo or a jungle, especially fitted for that darkish behind-the-tree corner.

A lake does much for a scene. A little paint on galvanized metal gives a very good imitation of water, with the addition of green moss around the sides, and a small sailing-boat.

And a fountain! Imagine a fountain that actually sprays water! Use the cover of a soup can for a base. Run copper tubing through it, and mold concrete by hand around the tubing in the shape of a fountain. Put holes in a pipe cap to act as spray, and screw this to the copper tubing, the amount of water spurted being regulated by the screwing. Keep the water in a small reservoir, and use a tiny force pump to send the water into the fountain and back to the reservoir again.

A tunnel adds interest to the train and requires less skill than patience to make. Begin saving newspapers a long time ahead. Make a rough form out of cardboard approximating the size and shape desired. Soak a dozen or more newspapers, add them to this form with a flour and water paste and dry in the sun. Repeat this process daily until the tunnel is of adequate thickness. Then paint to obtain any desired natural effect.

If you are going in for a snow scene you may like an igloo. On a cardboard base build a round wall of loaf sugar, leaving a space for a door. Cover this wall with melted paraffin to hold sugar together. For the roof use the lid of a saucepan, cover with melted paraffin, lay loaf sugar close together in the paraffin, then cover the whole again with paraffin. Result—a sparkling icy igloo with a fairyland flavor.

A fence is desirable to give unity to a scene. For a good-looking and decorative fence use skewers saved from the roasts.

A toy village gives definite scope for invention and development. You will find as you progress that ideas spring from ideas. Once you have indulged in a toy village, however small its beginning, you will find it as essential to the Christmas tree as the stuffing to the turkey.—*Myrtle Adams.*

An ice box rule to remember: Most fruits and vegetables of the temperate zone stand storage temperatures nearer freezing point than produce of tropical origin can take.

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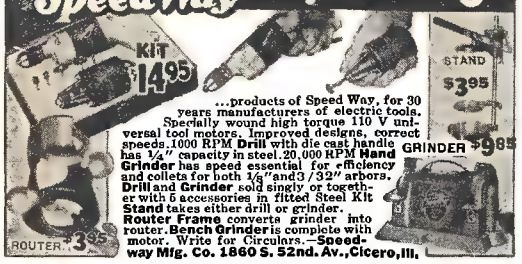

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The Westland "Lysander"

[*Continued from page* 88]

not be accomplished once they are joined. Apply cement liberally to these blocks, as they must form a solid unit with the two bulkheads between which they are situated.

The streamlined fairings may now be attached to the landing leg wires. These are shaped from ½x3-in. hard balsa. Groove them deeply on the undersides, fill with cement, press over wires, and when dry give two more coats of cement. Pieces of $\frac{1}{16}$-in. sheet balsa are then cemented to the undersides and sanded down at the edges until a perfect fit. Make the wheel fairing from ⅛-in. sheet balsa cut as shown and laminated. Apply pressure while the cement is drying so that the layers will adhere properly. The back sections are then cut out and dowels sunk in the tops of the front halves. Holes to receive the dowels are drilled up into the bottoms of the leg fairings. Aluminum catches hold the backs in place. A glance at the drawing will make clear exactly how the entire wheel fairing assembly operates—a necessity in order that they may be instantly and easily removed for flying. If you wish to detail your model, carve the built-in headlights out of front of wheel "pants." Line them with tinfoil and cement a celluloid lens over each. Machine guns are cut from short lengths of 1/16-in. aluminum tubing (you can roll these from scrap sheet) and stuck in place. Slip the 2⅝-in. air-wheels on their axles and solder copper washers to axle ends.

The center wing section is now cemented by the spars to tops of double bulkheads, which are cut flat for this purpose.

Next comes the cockpit framework, which is made from bamboo or reed and sheet aluminum. These members are all cemented to the cockpit sill and to each other, and covered with sheet celluloid. Before covering, however, be sure to install coil and wiring. The aft cockpit hatch is removable, and slides back and forth on an aluminum track, exactly as on its prototype. The batteries are located under this hatch and it is also a good place for the switch. Study plan details for the cockpit framing carefully before starting to work on it.

The demountable wing struts are made as illustrated from ¼x½-in. balsa set in their bases of ½x2-in. balsa. Both struts and bases are sanded to streamline shape. The outer ends fit into aluminum sleeves, and the bottoms are attached to the landing leg fairing by means of reed dowels. As a matter of fact, it is not absolutely essential to make these struts removable, and should you desire to follow the line of least resistance in construction, you may cement them permanently in place. However, the removable type is recommended as being better from a flying standpoint.

Cement tail surfaces in place as shown, and your model is ready to be covered. Bamboo

[*Continued on page* 133]

The Westland "Lysander"

[*Continued from page 132*]

paper is recommended for this job, but you may use silk if you prefer. Underparts should be tinted a sky blue. The camouflage colors are dull green and greyish brown. One coat of clear dope and two coats of colored dope will be sufficient. If you want a real-airplane finish on your model, top it off with a coat of clear lacquer or marine varnish. The slight weight this adds won't affect the model's flying ability and will give it that realistic appearance so desirable in scale jobs. A British R. A. F. insignia—blue bull's-eye surrounded by a white and a red circle—should be applied to upper and lower extremity of each wing, and to center of fuselage just behind cockpit. Serial numbers starting with a "K" go on the rudder and on the fuselage in front of the stablizers.

Take your model out to a field covered by tall grass and give it a glide test. Lay a couple of strips of Scotch tape over the wing joints just as a safety precaution against motor vibration working the dowels loose. And don't forget to remove wheel fairings, motor cowl and wing struts before gliding or flying. Balance by shifting the batteries forward or backward until she is just right. Then find a good big smooth field of about a million acres without any obstruction and perfectly flat, start your engine—watch her take off!

BILL OF MATERIAL

Westland "Lysander" 50" Scale Model

BALSA (Ample waste allowance)

- 1/4x1/2-in.—136-in. for wing spars and struts
- 1/8x1/4-in.—60-in. for strip aft leading edges
- 1/4-in. sq.—150-in. for leading and trailing edges
- 1/8-in. sq.—100-in. for some fuselage stringers
- 1/8x1/16-in.—bundle, for remaining fuselage stringers
- 1/2x3-in.—1-ft. for landing legs
- 1/8-in. sheet—6 pieces 4x36-in. for fuselage bulkheads, keel and some of wing and tail ribs. Also for wheel fairings
- 1/16-in. sheet—3 pieces 3x36-in. for most wing and tail ribs, part of engine bulkhead (use plywood, if you prefer) and wheel fairings.

OTHER MATERIALS:

- 2-ft. of 3/16-in. hardwood dowel for wings. Small piece bamboo or 1/8-in. reed.
- Aluminum tubing for above
- Piece sheet aluminum
- Piece sheet celluloid
- 1 pr. 2 5/8-in. airwheels
- 1 sponge rubber tail wheel (1-in.)
- 2-ft. 1/4x1/2-in. hardwood for motor mounts
- 4-ft. 1/16-in. spring wire
- 3 sheets bamboo paper. Clear and colored dope. Cement.
- Midget gas engine of 1/7 horsepower, with 10-in. propeller
- 4 1/2-in. spun aluminum motor cowl.

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[*Continued from page* 91]

shutters are then glued on each side, completing the job with the sill and lintel. A sash is made of thin wood strips notched together at the joints. All casein glueing should be done on the raw wood, never over painted surfaces. The shutters, however, being of a different color than walls or sashes, may be painted on the exposed side and edges before glueing in place. For an extra fancy job, the celluloid should be glued on the inside of the window opening, and held by a frame placed over it, the sash then being built-up on the outside, as described above.

A window box consists of a block of wood cut in the shape shown, drilled with small holes and the stems of small paper or wax flowers inserted, Fig. 3.

The bay windows are built directly upon the window openings in the front wall, as in Fig. 6, and sash built on as in the other windows. It is a simple job with a circular saw. The mullions or strips are not glued to the celluloid, however; only at the ends.

Detail of the front door is shown in Fig. 4. No opening is cut in the front wall, but the door is outlined with a neat frame, and a fan-light cut through above. Or the latter can be left solid and painted blue, with sash glued over as in the dormer windows. A cut-out pasteboard panel gives a pleasing effect on the door.

For the color combination, more latitude is permitted on a doll house than a full size structure. Hence, a red roof, cream walls and green shutters is suggested. The rooms could be painted or wall-papered. Stairway in white, hand rail in mahogany stain.

Toys From Maple Dowels

[*Continued from page* 102]

tightly so that they may be removed and changed around, as with the horse and giraffe. Heads and feet are mostly of ⅜-in. and ½-in. stock, but other sizes may be worked out as the occasion arises. The fence may be made as extensive as desired by adding more lengths to it.

If desired the pieces may be glued together and painted. The crow, the hen and rooster are treated in this manner. The crow is black, with yellow bill, and yellow eyes with black centers. The hen is white, yellow bill, black tail and back and on top of head, while the rooster has red tail and back. Both have white eyes with black centers.—*Dick Hutchinson.*

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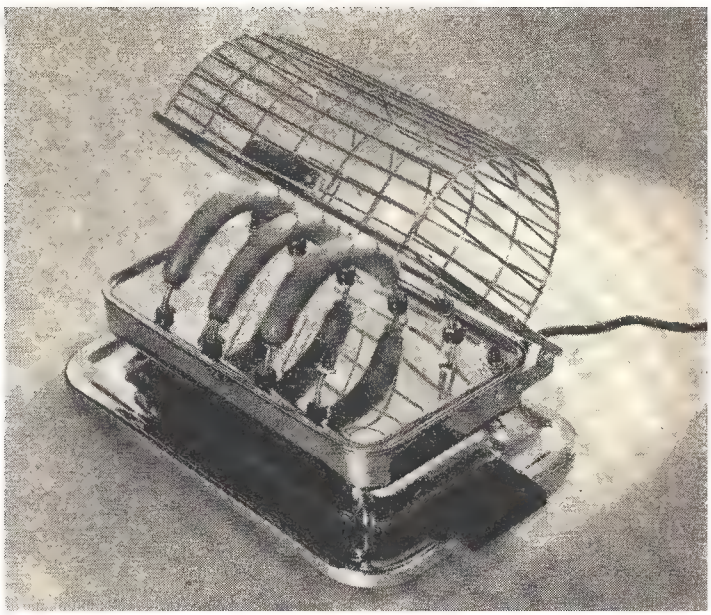
Hot Dogs Broiled In Fast Time



With this chromium cooker four hot dogs may be broiled at once in near record time. The cooker has two sets of electrically wired prongs for each frankfurter. When the plug is inserted in an electric socket and the protective wire cage above the meat closed, a charge is shot through the prongs which quickly cooks the doggies.

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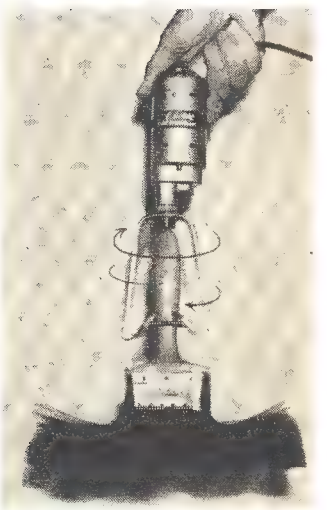

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Retainers For Turning Stock

[*Continued from page 94*]

size, the cup, of course, does not hold at all, the center being the only point of contact. Unless you have a steady rest for use with this small material, it will tend to bow in the middle and may pull clear of the tail point and fly out of the lathe. A set of very useful dowel retainers can be easily made up from a piece of heavy brass tubing having a bore of ½-in. and an outside diameter of ⅝-in. Cut 5 sections each 1½-in. long. Partially fill 4 of them with lead or babbitt metal as shown and bore the ends out with holes ¼, 5/16, ⅜ and 7/16-in. Ream these holes very slightly to allow free running. Equip each piece with set screws to clamp it to the tail spindle and drill small oil holes to lubricate the lead bearing surfaces and also to allow the oiling of the spindle point while the retainer is in place. The use of these retainers permits fast turning of small diameter stock with the assurance that it will not fly when it bows out. They also allow the doweling to be turned at greater speed without bowing.—*W. C. W.*

A spider's heart is in its abdomen.

Modern Hoop-Legged Table

[*Continued from page 93*]

a pipe flange. A hose clamp locks the hoops to the pipe.

One way of forming hoops from rod is to bend the rod around a nail keg, after first bolting one end of rod to the keg. Although preferred from the standpoint of strength, it is not necessary to weld the hoop joints. Good rigidity can be given the assembled table by simply butting the hoop ends together without joining, as shown in detail, and locking them in place by screwing to the top. Screw holes, however, must be drilled through the rod.

Unless the top is cut from hard wood, it is recommended that its thickness be not less than 1-in. in order that screws of ample size may be used without danger of splitting the wood. A little soap rubbed on the screws will facilitate driving them into hard wood after the proper sized holes have been drilled.

The graceful sweep of the hoops is best brought out by finishing the metal work in white. In pleasing contrast, the pine top was stained coffee brown (with coffee) and waxed.—*J. Modroch.*

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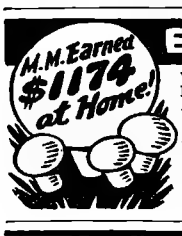

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Homemade Shooting Gallery

[*Continued from page* 97]

are fastened down with two large wood screws up through the base. The bearing holes are drilled at whatever height is necessary to give clearance for the worm gear that is connected to the shaft. Two spacing collars go tight against the bearing blocks on the inside to keep the worm gear assembly properly aligned. Drill a hole down through the top of each bearing block so the shaft can be occasionally oiled. On the end of the shaft is a one-inch pulley. This drives the target wheel with a rubber band belt.

The target wheel is made from 3 pieces of ply wood ¼-in. thick cut out and nailed together. Two pieces are 10-in. in diameter and one piece 9½-in. in diameter. Put small piece in center and nail together. Finish off with a rat tail file and sand smooth. (A little plastic wood put in groove and smoothed off gives excellent results.)

Find exact center of pulley and drill hole with expansion bit to exact size of roller bearing available. (Such as generator roller bearing, etc.) This hole must be exact as bearing must be pressed in with a little force to hold it in place. Take a piece of ¾x¾x8-in. stock and cut out eight pieces 1-in. long. These are to be nailed to target wheel at an equal distance around outside edge. To each of these blocks nail a 1-in. piece of automobile windshield wiper hose slit lengthwise. Into these insert the soda fountain straws to which milk bottle caps have been attached.

The target wheel support is made a piece of 2x2-in. stock, 18-in. long, notched out about 3-in. from one end to take a cross piece of white pine ¾x2x6-in. long. This piece is fastened to upright with two wood screws. One end of this cross piece is rounded off to a snug fit through roller bearing. When fastening upright to base board use two wood screws up through base into upright. Also use three angles 2x2-in., putting one on pulling side of upright. The other two on opposite sides. This upright piece can be made shorter if the soda fountain straws are cut in half. The base can be made up from any rough lumber approximately 24x16-in. with cleats screwed on bottom.

Inviting Name Boards

[*Continued from page* 105]

applicable to the individual case. Weathered old boards also have their merits for this purpose, and soft wood sandblasted with letters in bold relief, is definitely appealing. A Chinese red letter, edged with gold, is striking on natural wood and varnished all over will retain its luster for many seasons. A wagon wheel mounted as shown, makes a novel support for the name board. Each of these designs is well within the scope of the average homecraftsman, and an enterprising worker should be able to do a profitable business in a well-to-do neighborhood.

Build Fairview Farm

[*Continued from page* 98]

enclose any pasture, corral or meadow. A section is illustrated in Fig. 6, showing the short horizontal pieces at the bottom that prevent tipping over.

Jethro, the sturdy, efficient and up-to-date farmer, is cut from ⅛-in. plywood to the pattern given in Fig. 4, and painted accordingly. Tint the arms and face with flesh color, a combination of red, white and a dash of yellow, achieved by the trial-and-error system. Note that his hands are slotted to hold handles of buckets or other implements. Marthy, the capable housewife, is shown in Fig. 5, and she will suggest dairy equipment, such as milk cans, a churn, milking stool, etc. Marthy also has sole charge of the chickens, geese and turkeys.

Familiar barnyard animals are given in profile in Fig. 7, and are scroll-sawed from ⅛-in. plywood and painted in lifelike colors. A herd of cows should be marked with individual patterns, so that not all would be alike. In addition to the Holsteins and Jerseys, the brown and white Herefords could be included. You have a wide range of markings for the horses—dapple grays for draft, bay for driving, cream color for a pony, and some whites and blacks for variety. Chickens also lend themselves to many different plumage effects—Rhode Island Reds, Black Minorcas, White Leghorns, etc.

Build This Cycle Sled

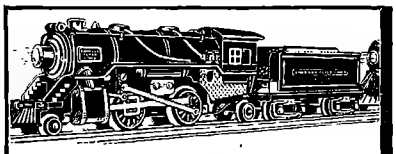
[*Continued from page* 103]

Now punch staggered holes in a heavy cowhide strap about ½-in. apart, and insert roofing nails that have been ground down until they protrude only ¼-in. Wrap a plain strap around the rim, cement to the chalkline and with a long lap joint. The studded strap is then wrapped tightly around this and also cemented with a lap joint.

Make a fork of flatiron and install the ball bearings from the original velocipede. This fork is pivoted to the steering post in a manner permitting the wheel to be forced down upon the ice to give traction, irrespective of surface irregularities. Steering post is merely a galvanized pipe with wooden handlebars for comfort in cold weather. Steel runners with edges ground to a vee are bolted to the wood members. Mount a fender over the wheel. Paint bright red with a monogram and you have a vehicle that will be the envy of all the boys in the neighborhood. It is not designed for snow use, however.—*H. S.*

The blue whale, biggest of living animals, is about 24 feet long at birth.

The plastics industry of the United States obtains 30 per cent of its material from the farm.



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Wood Sculpture

[*Continued from page* 104]

the whole may easily be sculptured in one evening.

To illustrate the principle, try it on the distinctive lion dinner gong, modeled after the stone lions of the famous Angkor Vat ruin of Indo-China. Details will be found very easily understood from the drawing, therefore a brief construction schedule only is given. Draw on 1-in. squared paper the outlines, and transfer to ¾-in. white pine with carbon paper, in the quantities noted on the parts, then saw out.

After sawing the base, assembly with glue and brads results in a practically semi-finished statue. The "squarish" outlines are merely rounded with jackknife, chisels, and sandpaper to smooth contours. A ¼-in. blind hole is made in the mouth roof, also a $\frac{1}{16}$-in. hole to meet it, which completes the woodwork.

A small brass Chinese bell from the ten-cent store makes the gong, the handle serving as striker. After applying two coats of buff enamel, and trimming in black, the bell or gong is hung on a wire pin, free in its bearings so as to ring true. We now have a very outstanding dinner gong, and simply made, which will bring admiring comment from fellow craftsmen, as has been the pleasant experience of the writer.

Four New Sleds For Old Slide

[*Continued from page* 111]

The bending is easily done by heating with a blow-torch and bending a short section at a time until the curve is completed. Method of plugging hole in tubing after screw is inserted is illustrated in the sectional drawing (circle).

A single panel of outdoor or weatherproof plywood and some ordinary pine lumber are all that is required for the "Neely", which is steered by hand levers.

"Snow Biscuit" is a speedy track horse built up of plywood-cutouts, a pine seat and strap iron runners. The steering is the same, in principle, as dragging a foot, except that in this case a pedal board takes the punishment and saves the shoe from wear.

The Dead Sea is so rich in mineral salts that it could supply some of these materials in sufficient quantity to meet world needs.

Wild ducks are increasing in the United States, but are still many millions fewer than they were 20 years ago.

Chemists recall that black and white were fashionable early in the World War because American chemists had not learned to make good dye colors.

Colonial Utility Stand

[*Continued from page* 109]

the three stretcher pieces as shown in Fig. 2. These ends too must be a tight fit in a ¾-in. hole.

The 10 degree angle of the legs is easily accomplished by drilling a ¾-in. hole in a large block at the proper angle, then mark out the locations of the legs on the bottom of the base piece. Then clamp the drilled block to the base over the mark for the leg location and then drilling to a depth of ⅝-in. Using this same jig block drill the two back legs for the 10 degree holes as shown in Fig. 2. Then drill all of the legs with a ¾-in. drill straight in for the side stretchers. Assemble the stretchers to the legs gluing in the holes and driving the stretchers in place. Now force the legs into the holes in the base piece again applying hot glue. If care has been taken the stand will be quite level but if it rocks the bottoms of the high legs may be taken down by using a wood rasp.

The drawer is next constructed using a piece of maple 9¾x3-in. for the front. Rabbet the ends and bottom of this piece to receive the ½-in. side pieces and the ¼-in. plywood bottom. Assemble as shown in Fig. 2. The drawer handle is 1x1¼x3¼-in. long with the ends rounded and gouged out as shown in Fig. 2. This is then screwed to the front of the drawer.

The drawer guides are ¾x¾-in. strips 9-in. long and are screwed to the inside of the middle pieces just below the drawer. A back stop of similar stock is screwed to the top piece located when the drawer is in the back position.

After the glue has set remove all traces of it and sand any rough places. Stain with a very light oak stain and then varnish. When the varnish is dry rub down with rotten stone in water. Then repeat the process. After rubbing with the rotten stone the second time wipe off all excess and then wax with a good furniture wax.

Sailing Sled Of Wood

[*Continued from page* 110]

The rear runner is a one-by-six board, 15 inches long, curved at one end as shown. Bore a quarter-inch hole half way through the runner from the top edge, and a slightly larger hole through the end of the reach board. A hole corresponding to the one in the runner is bored through the center of the one-by-four foot board, and an iron bolt is driven through the foot board and into the runner, the bolt fitting tight in the foot board and in the runner, but turning freely where it passes through the reach board. Place a metal washer between foot board and reach board, and two washers between reach board and upper edge of the runner. With this steering runner you can help guide the sled with your feet, and handle the sail with your hands.

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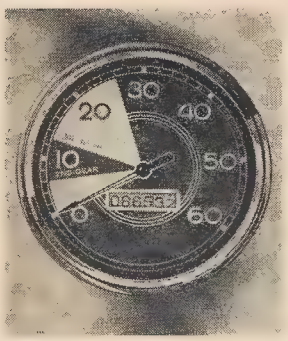
New Ideas for Home & Shop

Names and addresses of manufacturers of products described below will be sent free to any reader on request, provided a stamped, return envelope accompanies the inquiry. Mention date of issue when writing.

Of wide appeal to those interested in learning code signaling, a 3-in-1 instrument that combines a radio buzzer, flashlight blinker and wired telegraph has been officially adopted by the National Council of the Boy Scouts of America. Operated by a telegraph key, the instrument uses the International Morse Code.

Ink for use on glass or porcelain can be applied with pen, stamp or brush and resists acids, alkalis, solvents and high temperatures. It comes in red, white, blue and black colors.

A vibrator inverter converts direct current to alternating current. It operates at an almost constant frequency of 60 cycles and elimination of arcing gives it long life. It works from six, 32 or 110 volt current.



installed as standard equipment on trucks of a well known manufacturer, a new type speedometer tells the driver when to shift gears so as to secure maximum efficiency from his motor along with minimum engine wear and operating economy.

For cottages, camps, trailers and kitchenettes there is a light weight, well insulated, table top electric cooker. It may be had with one or two burners.

A fixture for lighting aisles in stock rooms uses fluorescent tubes. It gives even lighting to all shelves on both sides of the aisle, but it throws no direct glare into the aisle itself.

For collapsible tubes there is an automatic dispensing cap with a spring closed valve, which opens under pressure and closes automatically.

A new process for making stainless clad steel sheets and plates assures an oxide-free weld between the stainless cladding and the mild steel backing. Sheets and plates made this way work easier than solid stainless and can be spun, deep drawn or twisted without separation.

A high speed bookkeeping machine will post an original ledger and statement, prove figures on both records and provide a journal in a single rapid operation.

Equipped with a hinged, telescopic leg, this handy lap table is adjustable for any armchair and folds flat when not in use. Leg and hinge will lock at any height.

A book for the salesman's prospectus is made of transparent envelopes into which photographs or paper are easily slipped, back to back. Sales material is protected but visibility is not impaired.

Swelling or shrinking of lumber due to absorption or loss of moisture can be controlled by a new treatment for wood. Applied by brush, spray or dipping, it does not discolor or give off any odor.

A foot control switch can be used on all electrically operated machines, permitting the operator to use both hands and both eyes at all times while handling his work. It can be fitted to the machine in less than a minute, and the machine will operate as long as a gentle pressure is kept on the pedal.

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"Thanks to Uncle Sam

–tobacco's better than ever!

... and Luckies always take the better grades!" says Ray Oglesby, tobacco auctioneer for 8 years.

BENJAMIN HAWKS of North Carolina shows Auctioneer Oglesby his fine tobacco seedlings—grown by new U. S. Government methods.

RAY OGLESBY in action. Among *independent* tobacco experts like this famous auctioneer, Luckies are the 2-to-1 favorite over all other brands.

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Q. WHY HAVE TOBACCO CROPS BEEN BETTER?

A. Because, even though crops vary with weather conditions, Uncle Sam's new methods of improving soil, seed and plant-food have done a fine job.

Q. Do Luckies buy this better tobacco?

A. Yes, indeed—*independent* experts like Ray Oglesby tell you that Luckies always *have* bought the choicer grades of each crop. In fact, that's why Mr. Oglesby has smoked Luckies for 11 years.

Q. Do other tobacco experts prefer Luckies, too?

A. Among these skilled auctioneers, buyers and warehousemen, Luckies are the 2-to-1 favorite.

Try Luckies a week. You'll find them easy on your throat, for the "Toasting" process takes out certain harsh irritants found in all tobacco. You'll also know why . . . **WITH MEN WHO KNOW TOBACCO BEST—IT'S LUCKIES 2 TO 1**

Have you tried a LUCKY lately?

Double Page Spreads

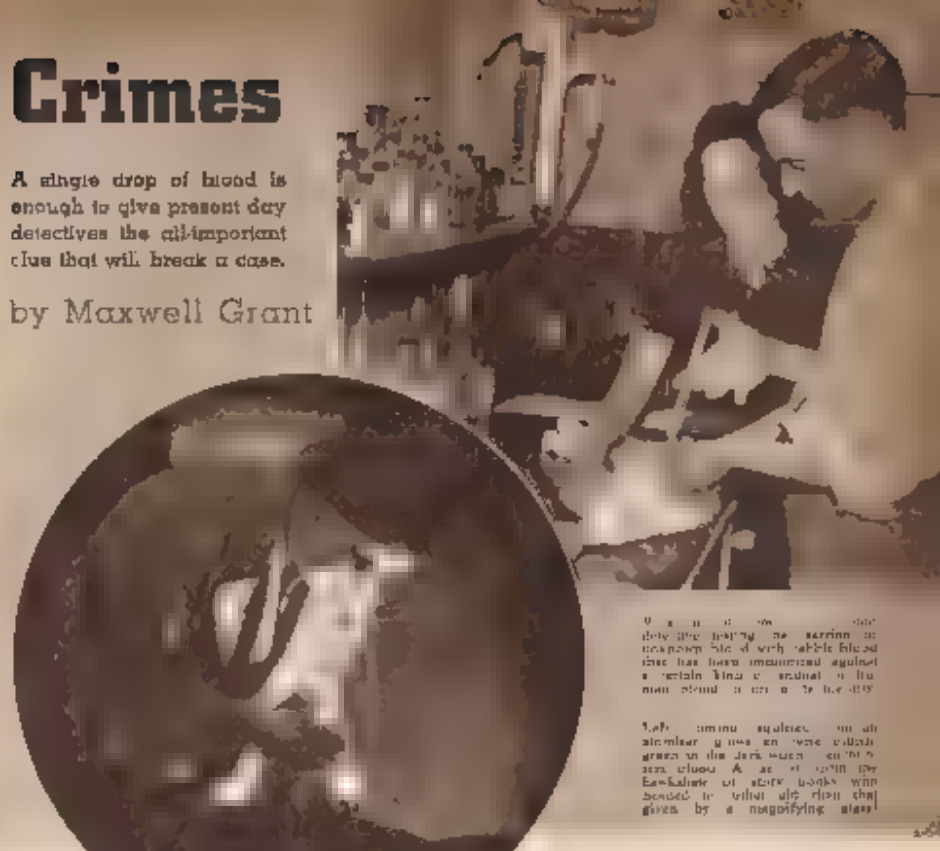
Blood Detectives Solve Crimes

A single drop of blood is enough to give present day detectives the all-important clue that will break a case.

by Maxwell Grant

A detective rests the stained cut a slide behind neat the stage of a microscope in search of more blood. Unlike the master sleuths of fiction, today's detective must make use a quick glance before step with another knowledge Also Blood

Left Taking dried blood from old holes in a rubber heel, found near the scene of a crime When captured, the criminal can a his connection a alibi the fact that or "putting his foot into it"



Upper ominous appearance dry blood may be serious to suspect but if with rabbit blood that has been immunized against certain kind of animal in the man stand a on a to the

Left ominous appearance dry blood stimulator gives an even reddish green in the dark room control area shows A as of blood the Exclusive of story books with bended to what she then gives by a magnifying glass

A CRIMSON smear on the garage floor near the body held the horrified attention of spectators at the scene of the crime Blood

But when the detectives came, they gave the bright splash of red hardly more than passing glance They searched carefully for the facts and scrutinized under the reddish-brown spots on the pavement near the door There the killer took a glass atomizer from his vest and stepped out into the darkness. Squatting beside the driveway he shot a fine mist from the nozzle, spraying back and forth upon the ground.

Suddenly a dim blue glow flickered momentarily among the grass roots. Another puff of spray brought a gleam of light a quicker blue in the darkness *Blood* showing by the weird light, generated through the package reaction of chemiluminescence" The liquid in the atomizer was "luminol," a synthetic substance recently found to yield an intense blue light when brought into contact with blood On hands and knees, across the adjacent lawn, the detective followed the weird trail which led finally to a side road where tire prints in the dust showed a car had stood These prints, dovetailing neatly into other evidence established one suspect's presence at the scene of the crime and led eventually to his confession. The mysterious bright red spots turned out to be nothing but old paint smears

Unlike the master detective of fiction, who took one look at the bright red spots on the floor through his trusty magnifying glass and exclaimed, "Aha. Blood " and followed this clue directly to the solution, the modern sleuth realizes it's not that simple He knows that whatever they may be—fruit juice, red paint or lipstick—they aren't blood. Blood spots are sometimes dark red, chocolate, or even green, but never bright red. He's more likely to look for the telltale blue glow that betrays blood stains where they are not visible, having been washed off

Not long ago a headline overcoat found in the back of a police car was flung upon the police chemist's laboratory bench by detectives who asked, 'Can you find any trace of blood on this coat" We're sure we've got the right man but he denies ever having touched the body.

From the way the thing's shrunk I'd say it looks as if he'd washed out any blood that was on it," observed the chemist, 'but let's see

He touched the coat at various places with phenolphthalein, sensitive indicator which shows the presence of blood, even if only one part in ten million. At once there appeared a trace of color appeared, but the chemist was doubtful.

It might have been some substance found again as might have been such as a compound of copper which sometimes reacts in the same way

He moistened the coat with water set it to stand a few minutes, then wrung out the water collected the fluid and heated it in an evaporating dish. When he had concentrated it to only a fraction of its former volume, he picked up a little with a piece of white blotting paper and added a drop of sour-smelling fluid—benzidine dissolved in acetic acid

Instantly a bright blue spot began to spread as the drop penetrated the paper

Your man knows more than he's telling, dryly commented the chemist, and when this evidence showed his denials were useless, the

Newest Glider Gadgets

Above: As the glider comes down on open field for a landing, the special flaps are visible on the tops of the wings, close to the fuselage. Left: The pilot sets up the glide path for the approach. Then he lowers the flaps and lands

Left: The radio operator in the car receives a message from the sailplane and informs the pilot how far he is from the reporting position. The receiving set is mounted underneath the dashboard with controls on the dash panel

Right: The ground crew's sending set is located in the rear roof compartment of the car. The telescopic antenna can be extended to a length of eight feet

SINCE our recent series of articles on gadgeting by Richard du Pont new gadgets to aid the sailplane pilot have come into use. The Ashuppers Gliding and Soaring Club of New York uses a wireless radio to check how its sailplane pilots fare in their cross-country flights. The radio weighs less than 12 pounds, including batteries and operates on a five-meter wave length. The pilot keeps in his position to his ground crew which follows him around in an automobile also equipped with a two-way radio

[Continued on page 121]

Taming The TWISTER

Harold M. Fo

Florida, long suffering victim of death and destruction dealing hurricanes, enlists science in its defensive warfare against the furies of wind and water.

The radiosonde is science's newest aid in its engaging tropical storms. Observers are shown about to launch the balloon whose radio will carry the instrument as high as 20 miles for observations. A tiny transmitter in the radiosonde sends observations by code to the complicated receiving apparatus in the glassed station below. Picture at right shows observer jotting down reports as they are received.

IT WAS September, 1926, when the greatest West Indian hurricane roared in from the Caribbean by night and staggered Florida's coast, eastside. It rocked and shattered Miami with crushing 160-mile winds. It lifted the angry sea from the Atlantic and flung it destructively on the unprotected mainland.

With incredible power it threw steel dredges and tankers, millionaire yachts and houseboats around Miami's rain-swept water fronts. Invisible claws of wind tore roofs from homes, crumbled towers and buildings, ripped off store fronts, killed and injured hundreds and made twenty-five thousand homeless.

The cyclonic bombardment lasted twelve hours. In that eternity of terror the huge guns of the tropical storm raked the peninsula with deadly effect, sweeping away bridges, undermining causeways, uprooting trees, smashing windows, snapping telephone poles and tossing automobiles around with fiendish ease.

The suddenness of the attack took even the experts by surprise. They hadn't expected the hurricane until the morning. Then, all at once, it was there, and they scarcely had time to sound the alarm, run up the warning flags and hang out the signal lantern.

When the storm passed, Miami and its neighboring communities were painful reminders of the warning reports they had been. Dredges worked day and night digging Miami Beach out from sand and debris. This horrible nightmare of 1926 has ever since made the entire nation hurricane conscious.

The stunned inhabitants of stricken Florida rebuilt. "Surely it was wisest to happen again," they thought. But it did in September, 1928, nearly as bad. Twister-like storms tore furiously at the palatial estates of Palm Beach and upset immense Lake Okeechobee, drowning thousands.

Ever since, South Florida has kept busy

A dramatic air view of the 1919 hurricane with disaster in the Florida Keys. A wall of ocean swept in to smash the rails and kill most of the 500 veterans about to board them.

Uncle Sam's soldier birds were real heroes in the World War but they couldn't fly at night. They've been taking lessons since then, and today finds us with a feathered fleet that is the finest in the whole world!

Pigeons about to alight on the U. S. Army's mobile loft, at the Army Signal Corps School, Ft. Monmouth.

How night fliers are trained. More experienced birds are released with the youngsters and guided back to the loft.

Turning Pigeons Into Owls

by James Nevin Miller

A light aluminum container holds a capsule large enough to carry maps and photographs on the pigeon's back. Below: Pigeon making hole at Fort Monmouth, N. J.

AFRAID of the dark? Not these pigeons. Even though it is against every instinct of a pigeon to fly at night, the U. S. Army finally has developed a bird that will fly any time—and anywhere. Regardless of rain, fog or the inky blackness of midnight, the new feathered fliers of the Signal Corps will stick on the job better than any soldier in Uncle Sam's ranks. In a word, the most spectacular soldier bird of all times has been developed: a homing, night-flying pigeon with the instincts of an owl and the eyes of a bat. To these most amazing birds, the mark and confusion of a battlefield at midnight are more natural than the blue sky and sunshine of the average day.

The Signal Corps' newest fledglings know [illegible] for the world night. They operate on a [illegible] hour shift and their successful development is a triumph for the Signal Corps over obstacles which man has been trying to [illegible] for years.

Before they are five weeks old, those [illegible] that their aging will refuse to function in the dark will not be [illegible]. The [illegible] the pigeon drop is [illegible] hours or more ago and placed immediately into darkened lofts. Then, every night they are let out for regular exercises, beginning just before dusk on the first night and continuing each evening from then on regardless of weather conditions until the

When the army was under the [illegible] they ate up an [illegible] one which [illegible] on the back of an [illegible] known as a "pigeoneer."

Will This Be Our 1960 Model Car?

by Hi Sibley

A glimpse of the highway of tomorrow, showing the futuristic cars speeding along at close to 100 m. p. h.

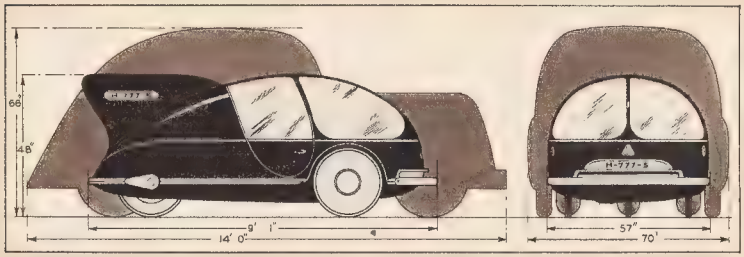
WILL chemical science revolutionize automobile design in the next generation? It is entirely within reason to predict that the car of the future will weigh one-fourth as much as the average current automobile, travel twice as fast with complete safety, run as silently as a breeze and sell for less than one hundred dollars. It may be driven by an entirely new power—the controlled expansion of liquified gases in a pressure engine, without ignition, fumes or noise and vibration due to reciprocating parts.

Here are the drawings of a car along these lines. Power is derived from two complemental gases, which we shall designate as X and Y. These have been liquified under tremendous pressure which renders them inert until they are mingled together in liquid form. At that instant they begin to vaporize with attendant expansion, but *do so gradually enough to be controlled and applied to useful work.*

Such a gas could be used in a simple pressure engine, such as a rotary engine devoid of reciprocating parts. It would run as smoothly as an electric motor. This type of engine would be simplicity itself.

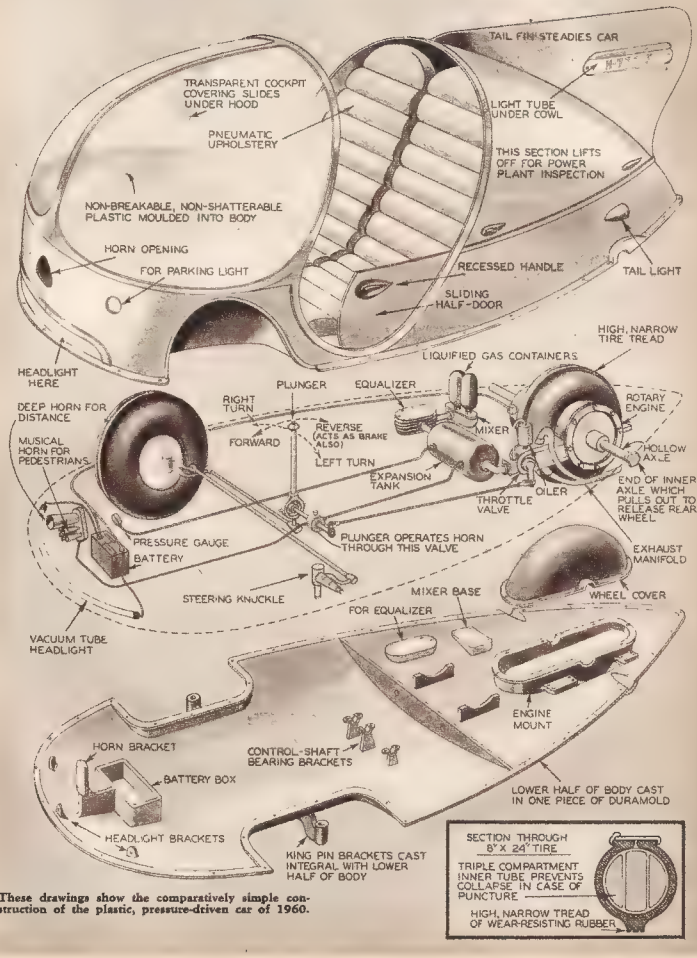
Development of plastics makes possible the forming of the automobile body in two halves, something like a walnut shell except that the lower half would be more shallow. Such a plastic, known as Duramold, has already been developed and is now manufactured by a secret process. It has been proved ten times as strong as stainless steel, weight for weight, and is now used in quantity production in airplane fuselages.

In the plastic chassis the front axle is integral with the lower half of the body, as well as housings for rear axle bearings, brackets for various fixtures, etc. There are no springs, but super-size tires at low pressure absorb all shocks in this light car. To avoid road suction of these large tire surfaces, each



This diagram shows how the car predicted for 1960 will compare with the average car of today in size. A much shorter wheelbase and the single rear wheel will make for far greater maneuverability—parking will be a pleasure in 1960!

A gearless "teardrop" of plastic is the prediction for tomorrow's automobile.



These drawings show the comparatively simple construction of the plastic, pressure-driven car of 1960.

SWING-OPEN DOLL HOUSE

HINGED on one end, this novel doll house opens out like a suit-case to give full access to all the rooms. When closed, it has the appearance of a conventional job. Construction throughout is of ¼-in. plywood assembled with brads and casein glue.

General dimensions, floor plans and location of windows are given in Fig. 1. Note that sashes are installed in all window openings, but these may be dispensed with if you prefer to simplify the work. Front and rear doors are not cut through, but merely outlined with the framing. The front door, however, has a fan-light cut out at the top, and panel effect achieved by glueing on a pasteboard veneer, as illustrated.

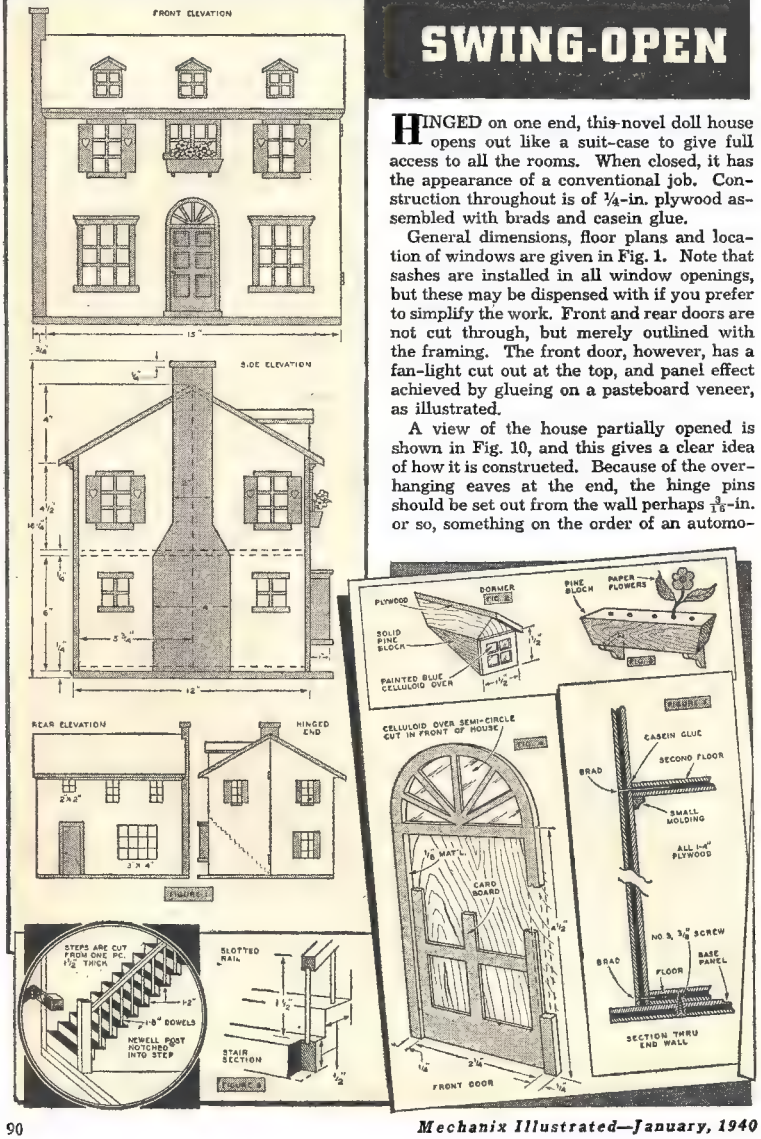
A view of the house partially opened is shown in Fig. 10, and this gives a clear idea of how it is construeted. Because of the overhanging eaves at the end, the hinge pins should be set out from the wall perhaps $\frac{3}{16}$-in. or so, something on the order of an automobile door. Use substantial brass hinges, with blocks glued on the inside of the wall, as indicated. Arrangement of floors is shown in Fig. 5. The second floor should rest on a molding strip glued to the wall.

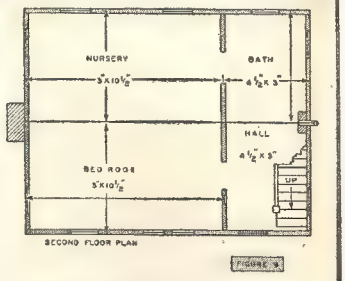
The staircase may be a simple set of steps cut from a solid block, or built up of smaller pieces glued together, Fig. 8. A railing is not hard to make, as shown here. The spindles may be dowels or ⅛-in. square sticks, glued into a slotted rail. The lower ends are set in holes drilled in the treads.

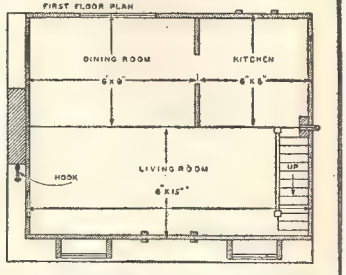
Dormers are simply dummies made of solid blocks glued to the roof. A window effect is made by painting the end of the block blue, placing celluloid over this and gluing a built-up sash on it, Fig. 2.

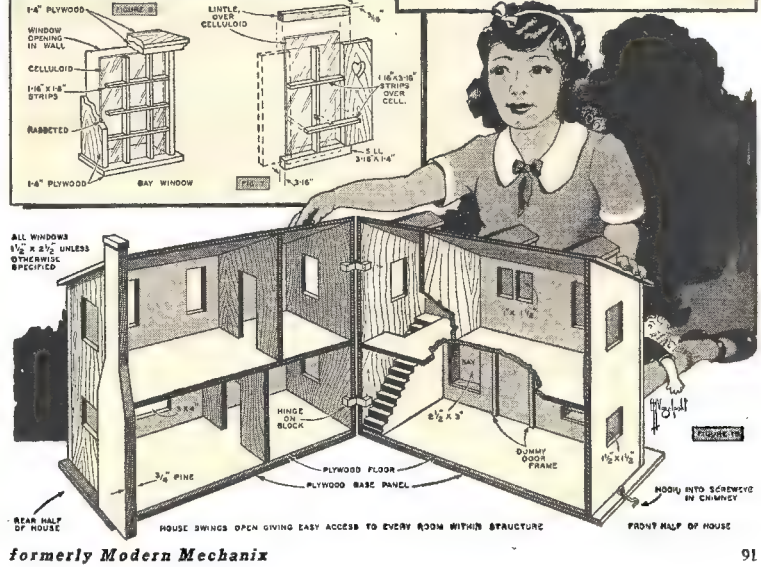
Windows with sashes are made as shown in Fig. 7. First, a rectangle of celluloid is glued to the window opening. The celluloid should overlap about ⅛-in. all around. Dummy

[*Continued on page* 134]

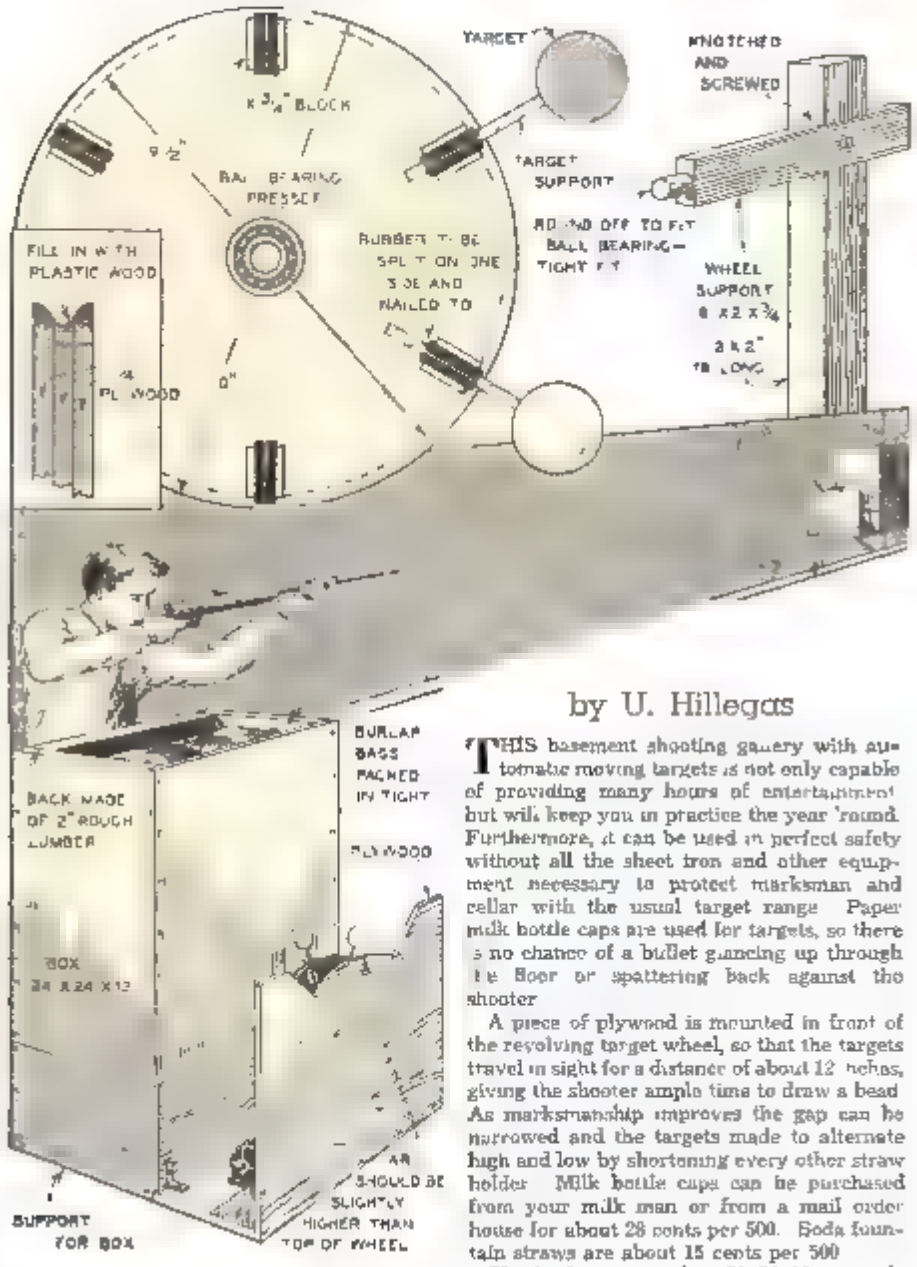







ALL WINDOWS 1½" X 2½" UNLESS OTHERWISE SPECIFIED
HINGE ON BLOCK
DUMMY DOOR FRAME
PLYWOOD FLOOR
PLYWOOD BASE PANEL
¾" PINE
REAR HALF OF HOUSE
HOOK INTO SCREWEYE IN CHIMNEY
FRONT HALF OF HOUSE
HOUSE SWINGS OPEN GIVING EASY ACCESS TO EVERY ROOM WITHIN STRUCTURE

A HOMEMADE SHOOTING GALLERY FOR THE CELLAR


TARGET
KNOTCHED AND SCREWED
¾" BLOCK
9½"
BALL BEARING PRESSED
TARGET SUPPORT
ROUND OFF TO FIT BALL BEARING—TIGHT FIT
RUBBER TO BE SPLIT ON ONE SIDE AND NAILED TO
WHEEL SUPPORT 6 x 2 x ¾
2 x 2" 18" LONG
FILL IN WITH PLASTIC WOOD
¾" PLYWOOD
BURLAP BAGS PACKED IN TIGHT
PLYWOOD
BACK MADE OF 2" ROUGH LUMBER
BOX 24 X 24 X 12
BAR SHOULD BE SLIGHTLY HIGHER THAN TOP OF WHEEL
SUPPORT FOR BOX

by U. Hillegas

THIS basement shooting gallery with automatic moving targets is not only capable of providing many hours of entertainment but will keep you in practice the year 'round. Furthermore, it can be used in perfect safety without all the sheet iron and other equipment necessary to protect marksman and cellar with the usual target range. Paper milk bottle caps are used for targets, so there is no chance of a bullet glancing up through the floor or spattering back against the shooter.

A piece of plywood is mounted in front of the revolving target wheel, so that the targets travel in sight for a distance of about 12 inches, giving the shooter ample time to draw a bead. As marksmanship improves the gap can be narrowed and the targets made to alternate high and low by shortening every other straw holder. Milk bottle caps can be purchased from your milk man or from a mail order house for about 28 cents per 500. Soda fountain straws are about 15 cents per 500.

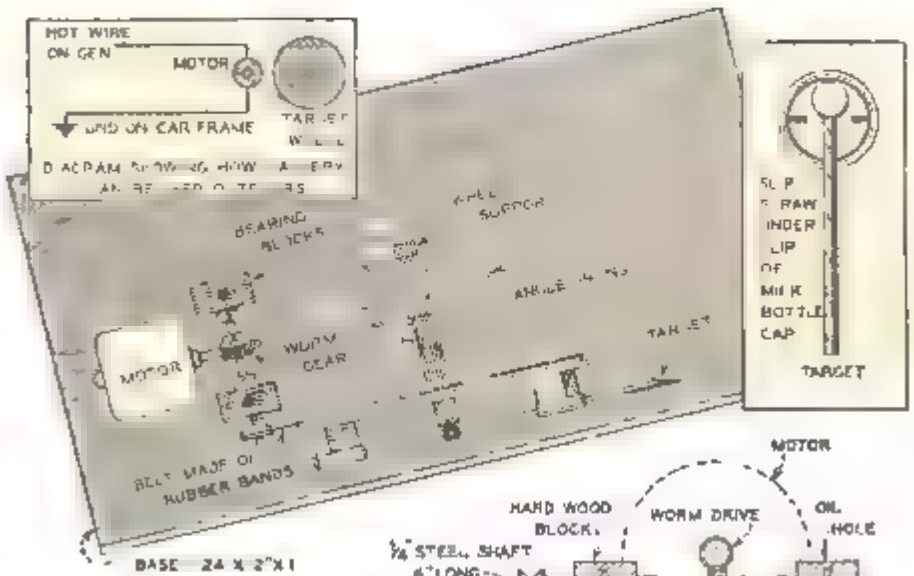
The back stop is a box 24x24x12-in. made from rough lumber. The top is left open and the inside filled with burlap or rags rolled very tight. The back should be at least 2-in. thick, and the front can be plywood. After the front has been shot out, remove the lead from the box, then renew and replace front. This backstop will stop a .22 long rifle bullet.

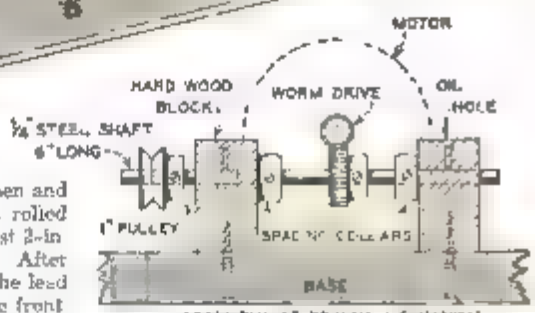
If you wish to use the target outdoors it can be equipped with a 6-volt automobile heater motor. These motors are obtainable at all auto supply stores and are very inexpensive. A heater switch is mounted on the base of the target and two long leads with battery clips are attached to live wire on gen[illegible] of your car and ground.

For cellar use, however, an electric fan motor furnishes the power, and it can be a small one as very little power is needed. Almost all small electric fan motors have built-in resistors for speed regulation. A speed of 3½ revolutions per minute for the target wheel is just about right. The motor is mounted in a cradle as shown and fastened with two pieces of strap iron, bent down over the top and bolted through the base.

Drive assembly is made from a discarded erector set. A piece of shafting 6-in. long turns in two hardwood bearing blocks which

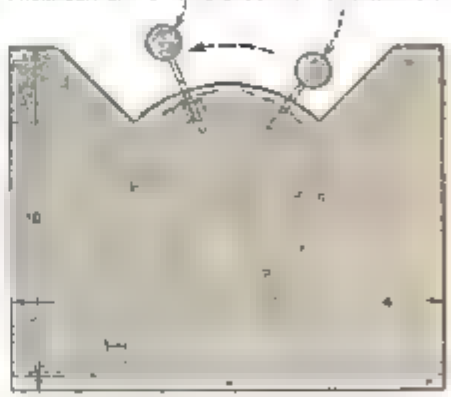
[Continued on page 142]



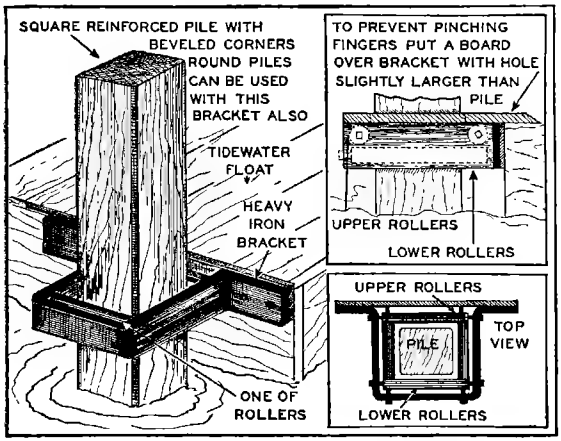


ASSEMBLY OF DRIVING MECHANISM

TARGETS MAY BE SPACED AT VARIOUS DISTANCES FROM CENTER TO MAKE SHOOTING MORE DIFFICULT



FRONT VIEW OF TARGET SCREEN—MADE OF ¼ PLYWOOD NAILED TO BASE

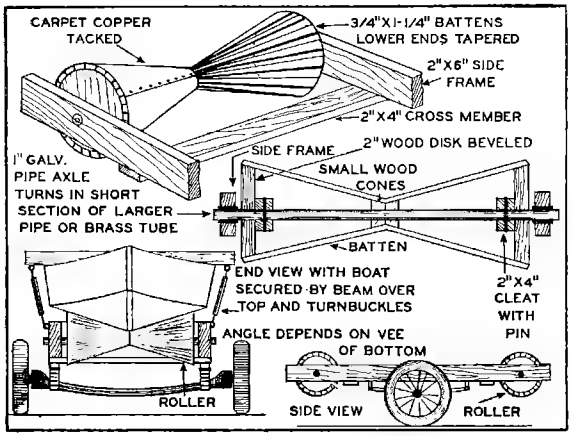

SQUARE REINFORCED PILE WITH BEVELED CORNERS
ROUND PILES CAN BE USED WITH THIS BRACKET ALSO
TIDEWATER FLOAT
HEAVY IRON BRACKET
ONE OF ROLLERS
TO PREVENT PINCHING FINGERS PUT A BOARD OVER BRACKET WITH HOLE SLIGHTLY LARGER THAN PILE
UPPER ROLLERS
LOWER ROLLERS
UPPER ROLLERS
PILE
TOP VIEW
LOWER ROLLERS

Guide For Tidewater Floats

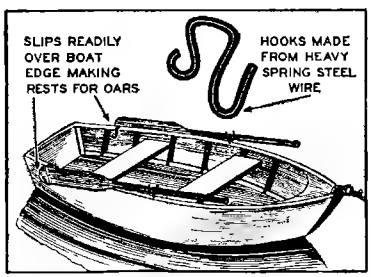
TO PREVENT undue motion laterally caused by waves, guides attached to the shore side of landing floats are very efficient. Only two are required, one at each corner of the float, fitted with rollers made of galvanized pipe over heavy bolts. Heavy strap iron, galvanized if possible, forms the brackets. —*H. S.*

Boat Rolls On Trailer

AN EASY way to load a boat on a trailer without excess effort and without marring paint or damaging planking is illustrated at right. Size and slant of rollers depend on hull measurements, but this carrier can be built to accommodate any medium or lightweight boat.—*H. S.*


CARPET COPPER TACKED
3/4"X1-1/4" BATTENS LOWER ENDS TAPERED
2"X6" SIDE FRAME
2"X4" CROSS MEMBER
SIDE FRAME
2" WOOD DISK BEVELED
SMALL WOOD CONES
1" GALV. PIPE AXLE TURNS IN SHORT SECTION OF LARGER PIPE OR BRASS TUBE
BATTEN
END VIEW WITH BOAT SECURED BY BEAM OVER TOP AND TURNBUCKLES
2"X4" CLEAT WITH PIN
ANGLE DEPENDS ON VEE OF BOTTOM
ROLLER
SIDE VIEW
ROLLER

IDEAS FOR BOAT OWNERS



Detachable Hooks Hold Oars

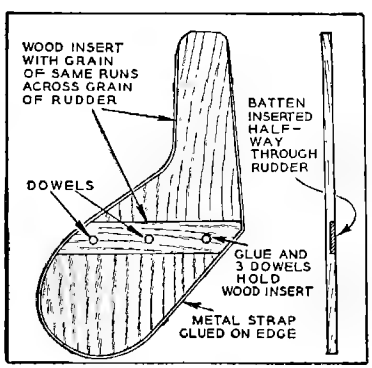
TO PROTECT oars from damage when shipped, and also to prevent water from dripping into the boat, a pair of the little wire hooks shown at left will be found extremely useful. They are slipped over the gunwales and when not wanted can be instantly removed.—*A. H. W.*

An Unbreakable Rudder

FEW things are more exasperating than to have a rudder split just when the wind is blowing right. To remedy this situation, try the rudder illustrated below.

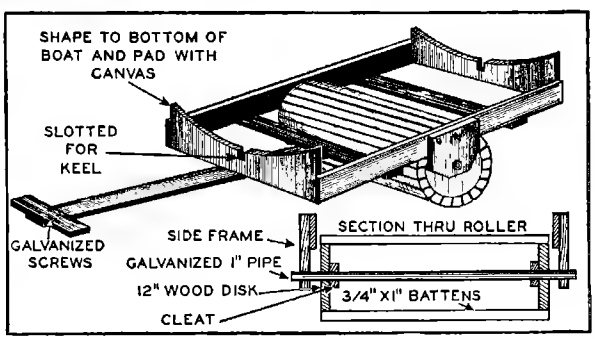
Make your rudder of good, seasoned wood that has been dried out thoroughly. Cut a 4-in. rabbet at right angles to the grain of the wood one half the thickness of the rudder.

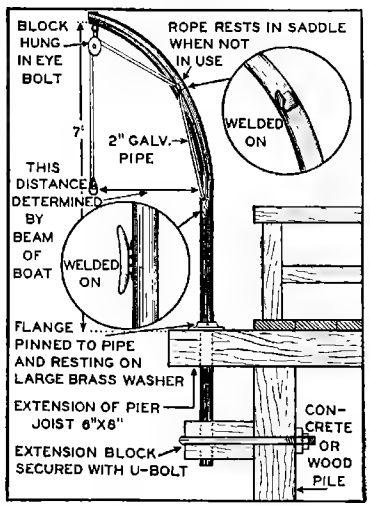
[*Continued on page 128*]


WOOD INSERT WITH GRAIN OF SAME RUNS ACROSS GRAIN OF RUDDER
BATTEN INSERTED HALF-WAY THROUGH RUDDER
DOWELS
GLUE AND 3 DOWELS HOLD WOOD INSERT
METAL STRAP GLUED ON EDGE

Mono-Roller Launches Light Craft

DUCK boats, kayaks, canoes and light skiffs can be easily launched by one person with the aid of this simple dolly. Rough or scrap lumber is suitable for its construction, but fastenings (screws) and axle must be galvanized to resist corrosion. Dimensions should be laid out to suit your boat. Give all wood a thorough undercoat of red lead.—*H. S.*

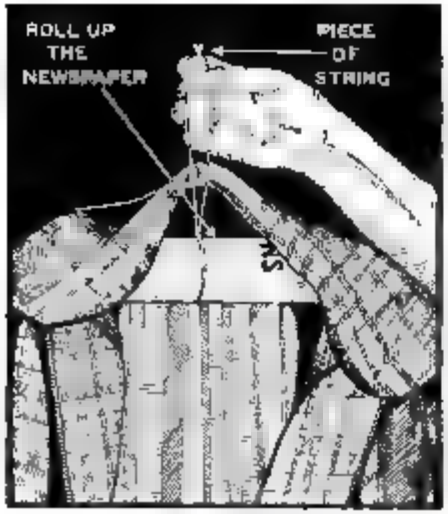



BLOCK HUNG IN EYE BOLT
ROPE RESTS IN SADDLE WHEN NOT IN USE
7'
2" GALV. PIPE
WELDED ON
THIS DISTANCE DETERMINED BY BEAM OF BOAT
WELDED ON
FLANGE PINNED TO PIPE AND RESTING ON LARGE BRASS WASHER
EXTENSION OF PIER JOIST 6"X8"
EXTENSION BLOCK SECURED WITH U-BOLT
CONCRETE OR WOOD PILE

Davits, Private Or Club Pier

DAVITS are often virtually essential on small piers, and a great deal of expense need not be incurred in providing them. The drawing above suggests a sturdy, durable, inexpensive installation, most of the parts for which can be obtained in a hardware store.

Household and Farm Tasks Made Easier

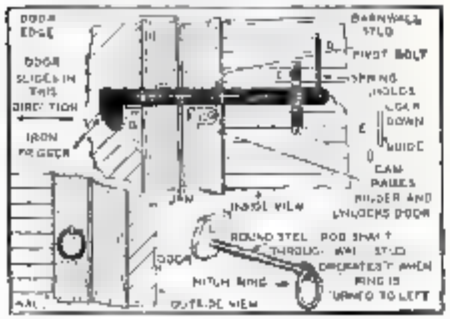


Improvised Coat Hanger

A SIMPLE but efficient garment hanger can be made in a few minutes from a newspaper and a piece of strong. Roll up paper tightly and tie it in the middle with string. Loop the end of the latter so that it can be hung conveniently on a nail or hook.—*W. S.*

Secret Barn Door Lock

THE owner of a barn in which was stabled much valuable live stock was troubled with unwanted visitors until he installed the door lock as suggested in the illustration. It proved a good one, and, known only to him and his help, prevented petty thieves and unwelcome guests from invading the place.

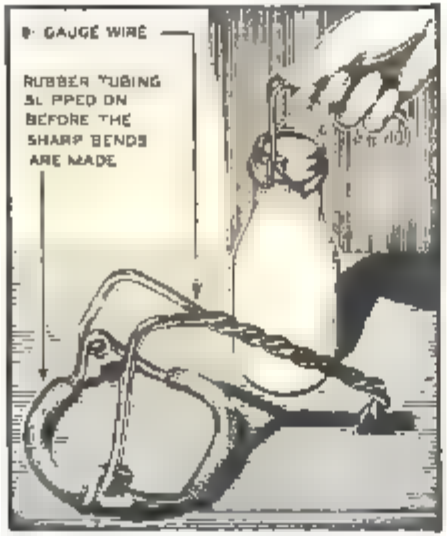


The door was slid closed against the wall. Then an iron latch A was pivoted by a bolt to the wall stud. Under the trigger end a hard-wood block B was fastened to the timber edge of door as shown. D is a spiral spring that raises that end of A so the trigger presses down on B. E is a strap iron guide to hold A near the wall.

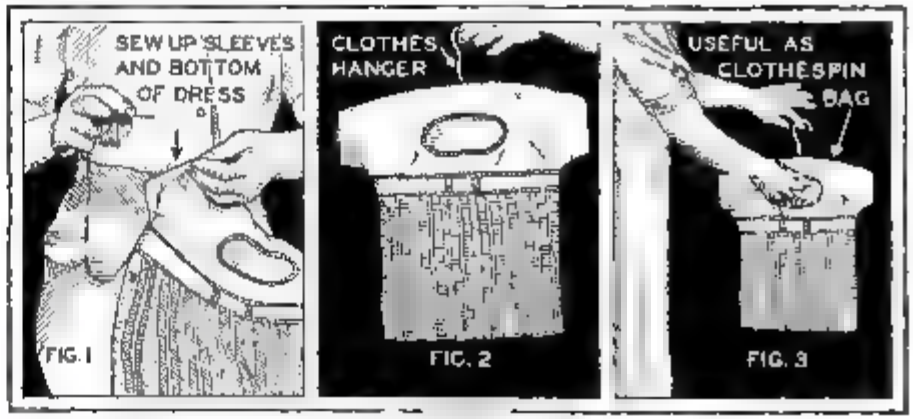
The secret part is a round iron shaft running through the edge door timber just ahead of the pivot bolt in A. To this, under A, was riveted or welded a cam C arranged to lift A when the shaft was turned. The shaft ended outside the barn in an eye through which was hung a round iron ring resembling a hitching-ring.

No one could open the door unless the hitchingring was turned so the cam raised lever A. This released it from block B and the door could then be slid open. Normally, the hitchingring presents a very innocent appearance and no one would suspect it to be a secret "Open Sesame" for unlocking the barn door.—*L. B. R.*

Milk Bottle Carrier



THIS is especially useful for children, whose small fingers can't grasp a bottle securely. Coat-hanger wire will do.—*H. N.*

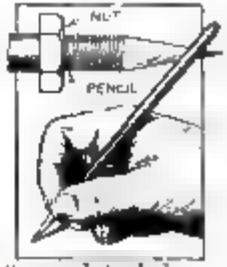


Discarded Dress Makes Decorative Clothespin Bag

A TORN or worn dress is easily made into an unusually decorative clothespin bag in only a few minutes of work. Sew up the bottom and the sleeves and leave the neck open. At the same time, sew in a clothes hanger across the shoulders. This acts as a convenient handle. Clothespins are dropped in through the open neck.—*H. Hayden*

Reading Glass Shade

READING glasses have a habit of picking up reflections which become very bothersome. An ordinary pint cardboard container which can be obtained at any grocery store or dairy, will serve excellently as a shade, eliminating this trouble. Remove the lid and bottom and cut a small hole in the side near the bottom. Unscrew the handle of the glass, put glass inside container and screw on handle through the hole.—*W. S.*



Improving Grip On Pencil

ROUND pencils tend to tire the fingers after they have been used any length of time. The grip can be improved greatly by the simple trick shown. Choose a common nut of the right size and screw it onto the pencil for an inch or two. This cuts threads in the wood. The pencil can now be gripped firmly and the fingers will not sweat.

Be careful not to use too small a nut. The best size is one that scores the wood without forming a full screw thread on it.—*D. V. H.*

Hang Up Brooms

BROOMS will last much longer if they are hung by their handles when they are not in use. If you merely let them rest on their ends, the straw will soon bend out of shape and stay that way.

COLONIAL UTILITY STAND IN NATURAL MAPLE

by Ralph T. Moore

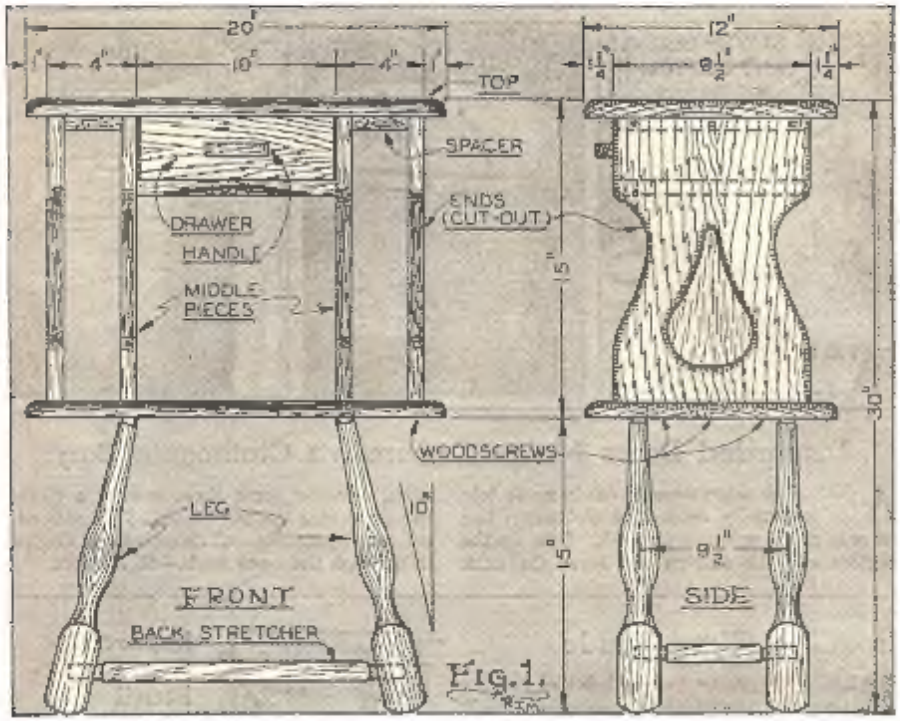


Fig. 1.

Early American simplicity of design marks this useful piece of furniture. Photo will be found on page 79.

Here's an ideal winter workshop project that can be constructed in an average time of about nine hours. Tools needed: Jigsaw, wood turning lathe, wood rasp, brace and bits, block plane, screwdriver.

THE present popularity of maple furniture opens a field of useful work for the home craftsman because he may not only experience the fun of making the piece but enjoy the pleasure and the use of it for a lifetime as well. This is true of the natural maple stand herein illustrated. Only a few evenings are required for the construction and, when you have finished the piece, you will find that the time was well spent. The construction has been simplified to bring it within the scope of the average workshop and there is no monotony of detail to detract from the interest of construction.

The bill of materials for this stand may be taken from Fig. 1 and 2 and the first step in the construction is the cutting of the pieces to the proper shape. Start with the ends and middle pieces. These are nominal 1x9½x13½-in. long. After squaring up these four pieces cut the design of the outside edges as shown in Fig. 2 in two of these pieces. These become the middle pieces. Then cut out the complete design in the remaining two pieces. These pieces are the ends. Now round all of the edges, not the ends, of all four pieces using a wood rasp. After roughing in this fashion, sand with coarse sandpaper, then with medium and lastly with fine. Too much emphasis cannot be placed upon this sanding as every mark will be magnified when stained.

The top and base pieces are next. Both of these pieces are nominal 1x12x20-in. long. Square these pieces, then plane off the edges and ends to a full rounding chamfer and then sand as above. Next cut out the two spacer pieces from 1x2½x9½-in. long. These need not be maple since they will not be prominent. Drill and countersink the two middle pieces from the side that is to be the inside along the top as shown in Fig. 2. Then screw the middle pieces to the spacer pieces. Lay out the underside of the top piece as shown in Fig. 1, and screw the spacers to the top piece. All joints should be glued with hot glue to secure the maximum strength. Now screw the end pieces to the spacer pieces. The holes in the outside of the end pieces are first drilled for the size of the screw, then these holes are counterbored with a ½-in. drill ⅜-in. deep. This will allow plugging of the holes with ½-in. dowels to conceal the screws. The dowels are then sanded off. Lay out the bottom of the base piece exactly as the top piece and drill in the locations shown for wood screws, countersinking the holes. Then screw the base piece to the ends of the middle and end pieces. A 1x1x10-in. piece is then rounded as shown in Fig. 1, and screwed to the middle pieces which were previously drilled. This piece forms the bottom of the drawer guide.

The legs are turned from 2-in. square stock to the design suggested in Fig. 2. It will be noted that the edges of the square feet are slightly rounded. These legs are exactly 14¾-in. long and the tops of these are turned to fit tightly in a ¾-in. hole. Next turn out

[Continued on page 145]

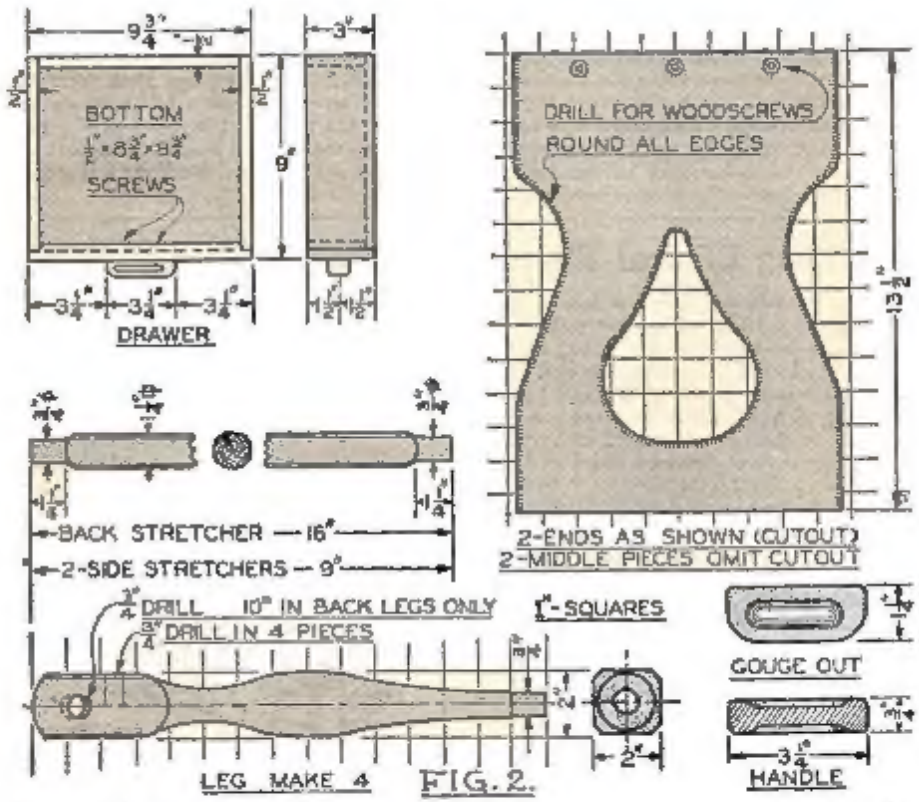


FIG. 2.

"MI" CAMERA TRIPOD

by Earl Ensign

HERE'S a sturdy camera tripod for photo fans. It is easy to build in the average home workshop and will cost about $2.00—which is quite cheap for a good tripod.

The legs should be of mahogany or similar close-grained wood. They are turned out on the circular saw as per drawings. Smooth them up and finish with linseed oil. Rub in several coats. Be sure not to varnish any of the wood parts that slide together. They will surely stick if you do.

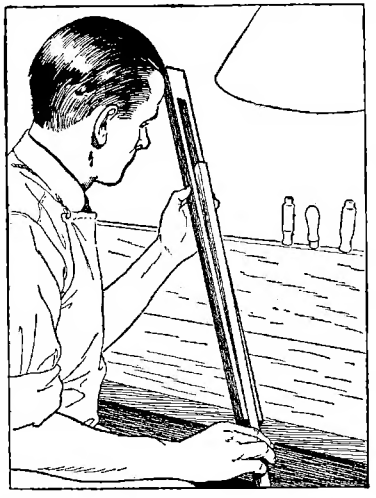
One casting is needed. This is for the head and is of aluminum. A pattern will have to be made for this part. It is a simple one, but make a good job of it as this will simplify assembly later.

The casting is machined on the top. Face it off as shown and bore the holes for the bolts which hold the legs in position. Be careful to get these holes parallel with the top surface of the head. Any suitable bolts can be used but it will look better with specially made ones of brass with nicely formed heads.

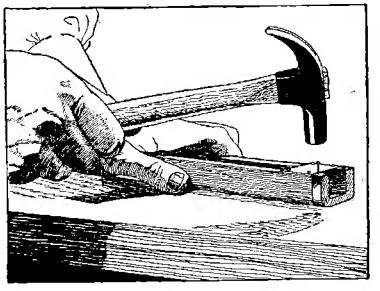
Trim up the ends of the legs with thin brass strips. Use escutcheon pins, which are small brass nails, for this. A square brass plate is nailed across the open end of each leg to hold the extension in its groove. The ends of the legs which fit in the head should also be brass-bound.

The screw for holding the camera is a simple lathe job and needs no special mention. The pins which fit in the ends of the leg extensions are of steel. They should be a tight fit in the holes which you bore for them.

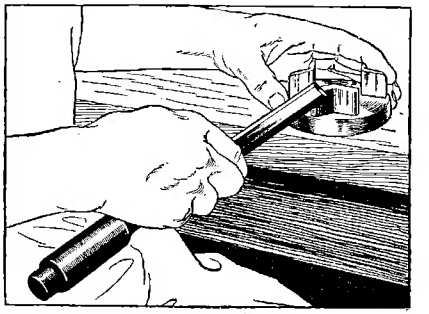
Use one ¼-in. carriage bolt in each leg extension for holding the legs to proper height. These bolts project through the slot in the legs. Any suitable knob with ¼-in. thread may be used for tightening.



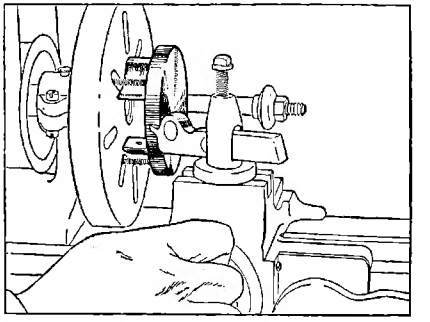
The inner leg slides easily within the main leg, yet fits snugly. The sliding parts are not to be varnished.



When the cutting and finishing is completed on the outer leg, add brass strips as shown for a final finish.

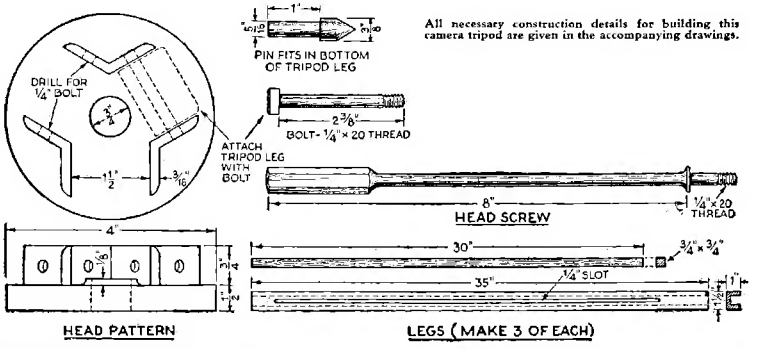


The MI tripod head is cast in aluminum. The pattern is made of wood to exact size. The cost of the casting depends on the accuracy of the pattern so great care should be taken in making it.



After the casting is made, it must be faced on a cutting lathe, as shown above. After it is machined on the top, bore the holes for the bolts that hold the legs in position. Be sure they align.

All necessary construction details for building this camera tripod are given in the accompanying drawings.



Variation In Exposure And Development

Exposure	Development	Results
Under	Under	Very thin and weak, only highlights visible.
Under	Normal	Thin, shadow detail weak or lacking.
Under	Over	Thin shadows, dense highlights, very contrasty, often fog.
Normal	Under	Thin, flat, detail throughout but weak.
Normal	Normal	Correct density and contrast, detail in all parts.
Normal	Over	Rather dense with too much contrast; detail may be obscured in highlights.
Over	Under	Somewhat thin, very flat, full detail.
Over	Normal	Rather dense, somewhat flat, full detail in all parts.
Over	Over	Very black shadows too heavy; detail lost in highlights.

Chalk Red Tones

WHILE not desirable for portrait work, chalk red tones are very suitable for firelight effects. A print to be toned by the following formula should be a good sepia, fully developed and well washed. If any hypo is present, it may precipitate the gold and stop the toning.

Solution A:		
Gold chloride	15 grains or	1 gram
Water	16 oz.	500 cc.
Solution B:		
Potassium sulphocyanate	90 grains or	6 grams
Water	16 oz.	500 cc.

Using equal parts, slowly add either solution to the other while stirring to prevent the precipitation of gold. The solution, which is now of a brick-red color, should stand for a few minutes until it clears.

Prints should tone to a chalk-red color in about 15 minutes and should then be fixed in the regular acid fixing bath and washed as usual. The color of the prints depends upon the amount and state of division of the gold deposited. If prints are removed from the bath after a short immersion just after action has been started, they will be a beautiful tone, neither sepia nor red.

The quantity given should fully tone five dozen 4x6 average prints. It may also be used with equal success in toning lantern slides and other glass positives.

1 What $14 camera gives me KODACHROME transparencies?

KODAK BANTAM (*f*/5.6). No extra equipment; just load with Kodachrome (full-color) Film . . . Through modern photofinishing methods, Bantam (*f*/5.6) also leads to black-and-white pictures 3¼x4 inches . . . Kodak Bantam, with Kodak Anastigmat *f*/5.6 lens, $14; with Kodak Anastigmat Special *f*/4.5 lens, $22.50.

2 What camera recently announced is equipped with that great new Supermatic shutter?

KODAK MONITOR SIX-20 (*f*/4.5 Special). The Supermatic is Eastman's new high-precision between-the-lens shutter, that is unsurpassed anywhere in accuracy. 9 speeds to 1/400 second. Other features: Kodak Anastigmat Special *f*/4.5 lens, new-type body shutter release, double-exposure prevention, automatic film stop. Price, $42.50.

Only EASTMAN *makes the* KODAK

PHOTO FAN'S CHRISTMAS-BUYING QUIZ...

3 What great miniature is a sensational value at its present price?

KODAK BANTAM SPECIAL. Super-precise Kodak EKTAR *f*/2.0 lens. 1/500 Compur-Rapid shutter. Coupled range finder. For black-and-white and Kodachrome full color. Price, $87.50 with field case.

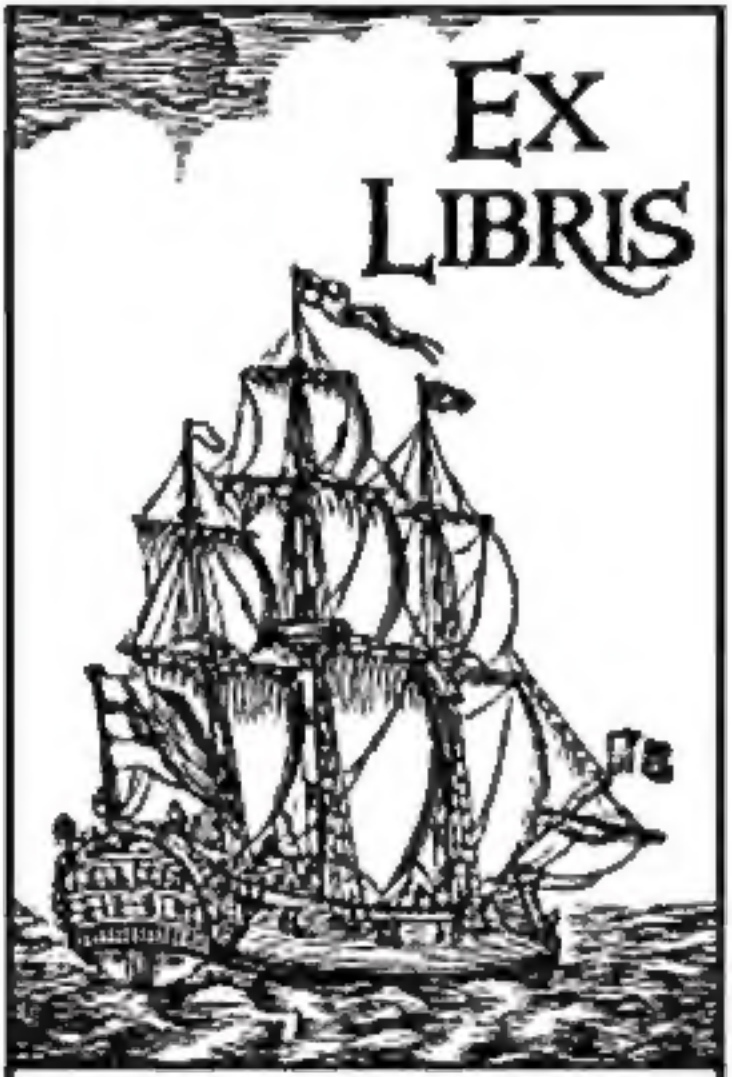
4 What 35 mm. miniature offers high precision at modest cost?

KODAK 35 (*f*/3.5). Gives you what you must have for dependable black-and-white and Kodachrome (full-color) photography. Precise, long-lasting construction. Special *f*/3.5 lens. Accurate 1/200 shutter. Double-exposure prevention. Automatic shutter setting. Exposure counter. Price, $33.50.

5 What movie camera is justly known as the "economy movie maker"?

CINÉ-KODAK EIGHT is the "economy home movie maker." Thoroughly capable, it gives 20 to 30 black-and-white movie scenes—each as long as the average newsreel scene—on a roll of film costing $2, *finished, ready to show.* For color movies, load with Kodachrome Film. Price, $29.50. At your dealer's . . . Eastman Kodak Co., Rochester, N. Y.

GREATEST VALUES IN YEARS



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